

**BALLUFF**

## **Software- Description**

**BIS V-6102-019-Cxxx / BIS V-6108-048-Cxxx**

**Function Block S7-300/400**



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## Function Block description for BIS V

### 1 INTRODUCTION

This function block is an example for the communication with a BIS V processor unit. The example is free of charge. Please test carefully if the FB is suitable for your application!

This function block enables a communication between a Balluff - BIS V-6102-019-Cxxx or a BIS V-6108-048-Cxxx processor and a Simatic® S7-300/400 PLC.

The following commandos are supported:

- Read data carrier
- Write data carrier
- Store Auto Read start address
- Type and serial number
- Initialize CRC\_16 data check
- Write constant value to data carrier

For each read/write head the function block has to be called with an own instance data block.

#### ATTENTION

Please test carefully if the used commandos are supported by the BIS V processor and the read/write head!

If an existing function block is replaced by this, the instance data block has to be re-generated, because the static variables have been extended.

#### 1.1 General Data

|                       |   |
|-----------------------|---|
| Function block name:  | FB31  |
| Instance data block:  | (an own instance data block has to be setup for each antenna or r/w head) |
| Invoked blocks:       | SFB4 TON  |
| Reserved memory bits: | none  |
| Reserved Timers:      | none  |
| Reserved Counters:    | none  |
| I/O length:           | 16 - 254 byte   |
| Invoke:               | absolute  |
| Device compatibility: | Siemens Simatic® S7 300/400 with SIMATIC Manager                          |

#### 1.2 Recommendations of FB invoke

The function block should be called only once for each read/write head. Multiple calls of the function lock at the same time are not allowed.

If the function block is conditionally called and the calling condition is false before FB sets it **Ready** output, the **Init** input have to be set.

If the PLC restarts the **Init** input have to be set for one cycle. FB parameters could be attached dynamic if necessary.

## 2 COMMISSIONING

The I/O data length of the processor unit depends on the available in-/outputs in the PLC (maximum 254 bytes). Modules of the same length have to be used for process data input and output.

### 2.1 DB parameter

The maximum read/write data length of the function block is 32,767 bytes. The data blocks for transmitting and receiving data have to be adjusted in size according to the parameters **Offset\_DBSend**, **Offset\_DBReceive** and **TAG\_NumbOfByte**.

### 2.2 Device parameter for BIS V-6102-Cxxx und BIS V-6108-Cxxx

Same values for the parameters **Dynamic Mode**, the **I/O start address** and the **IO length** have to be set in HW configuration and for FB call!

#### Device Parameter:

Device parameter slot 0

|                              |                  |   |   |
|------------------------------|------------------|---|---|
| <b>Global diagnostic</b>     | disable          | = | Not active                              |
|                              | enable           | = | Permit the module's diagnostic messages |
| <b>HMI read only</b>         | disable          | = | Device settings via display enabled     |
|                              | enable           | = | Device settings via display disabled    |
| <b>LEDs off</b>              | disable          | = | LEDs on                                 |
|                              | enable           | = | LEDs at the processor of after 30min    |
| <b>IO-Link Port Function</b> | NO input         | = | Input as normally open contact          |
|                              | NC input         | = | Input as normally closed contact        |
|                              | Output           | = | Output function                         |
|                              | IO-Link          | = | IO-Link function                        |
| <b>IO-Link Safe State</b>    | 0, 1, Last value | = | Save state of IO-Link Outputs           |

## 2 COMMISSIONING

### RFID Head Parameter:

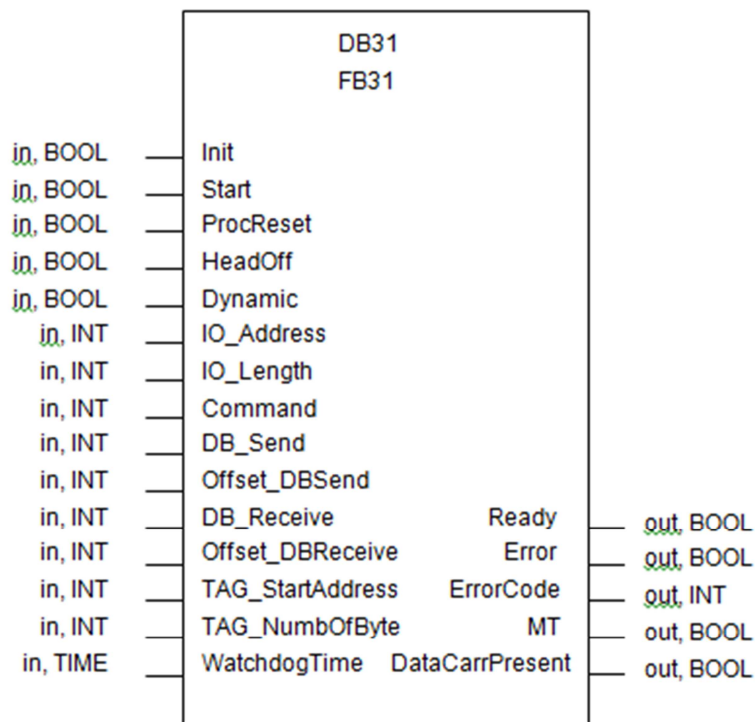
|  |            |   |   |
|--|------------|---|---|
| <b>CRC</b>                             | disable    | = | Not active  |
|  | enable     | = | The CRC check is a procedure for determining a check value for data in order to be able to recognize transmission errors.   |
| <b>Not available for BIS VU heads.</b> |            |   |   |
| <b>Dynamic Mode</b>                    | disable    | = | Dynamic mode deactivated. Error number 1 is applied if job is started without tag   |
|  | enable     | = | The processor unit accepts the job and stores it regardless of whether a tag is in the active zone or not. If the tag enters the active zone the stored job is run. |
| <b>Type and Serial Number</b>          | disable    | = | First bytes of data carrier are displayed.  |
|  | enable     | = | the type of the read/write head and serial number are displayed when CP occurs  |
| <b>Slow Tag Detection</b>              | disable    | = | Default, fast tag detection   |
|  | enable     | = | The antenna is switched on for tag detection only every 200ms   |
| <b>Low Antenna Power</b>               | disable    | = | Default, high antenna power   |
|  | enable     | = | Transmitting power is reduced for the read/write head.  |
| <b>Head LEDs Off</b>                   | disable    | = | Head LEDs are on  |
|  | enable     | = | The LEDs are switched off on the respective read/write head   |
| <b>UID Compare Count</b>               | 1..7       | = | This parameter indicates how often the 5-byte ID count of a BIS L-1__-03 tag is imported and compared before the tag is shown as identified                         |
| <b>Tag Type</b>                        | All Tag... | = | Default, all tag types are detected   |

More information concerning the parameters is available in the BIS V- manual.

## Function Block description for BIS V

### 3 FB PARAMETER DESCRIPTION

#### 3.1 FB illustration S7-300/400



#### 3.2 Input parameter

|                  |   |
|------------------|---|
| <b>Init</b>      | Function block initialization<br>Must be set for one cycle each time the PLC is restarted. Static variables, control bits and upcoming commandos are reset. The function is done when <b>Ready</b> is set again.  |
| <b>Start</b>     | Start function<br><b>Start</b> = 1 starts a job.<br>This signal must be set until the Ready output goes to 0.<br>The function is done when <b>Ready</b> or <b>Error</b> is set again.   |
| <b>ProcReset</b> | Reset function block and r/w head<br><b>ProcReset</b> = 1 sets the function block and ground state r/w head.<br>The signal must be set until the Ready parameter goes to false.<br>The function is done when Ready is set again.<br><br><b>The processor unit needs a few seconds for a reset sequence!</b> |
| <b>HeadOff</b>   | Head power is switched off.   |
| <b>Dynamic</b>   | Activation or deactivation of the WatchdogTime for dynamic mode<br><br>Dynamic = 0: Watchdog Timer is on<br>Dynamic = 1: Watchdog Timer is off<br><br>If the Dynamic Mode is used, the watchdog timer has to be disabled.   |

## Function Block description for BIS V

### 3 FB PARAMETER DESCRIPTION

|                         |   |
|-------------------------|---|
| <b>IO_Address</b>       | Start address of the in-/ output range of the PLC. The address may lie in the normal I/O range of the PLC or in the peripheral range.   |
| <b>IO_Length</b>        | Length of the in-/ output range, specified in byte. The value has to be set assuming parameterization in HW configurator.   |
| <b>Command</b>          | General Job type. Job type in hex format.<br><br>Command = 01 <sub>hex</sub> :        Read data carrier<br>Command = 02 <sub>hex</sub> :        Write data carrier<br>Command = 07 <sub>hex</sub> :        Store start address for "Auto Read"<br>Command = 09 <sub>hex</sub> :        Type and serial number<br>Command = 12 <sub>hex</sub> :        Initialize CRC_16 data check<br>Command = 32 <sub>hex</sub> :        Write constant value |
| <b>DB_Send</b>          | Data block for write data   |
| <b>Offset_DBSend</b>    | Start address for write data in the data block  |
| <b>DB_Receive</b>       | Data block for read data  |
| <b>Offset_DBReceive</b> | Start address of read data in the data block  |
| <b>TAG_StartAddr</b>    | Write/read start address in the data carrier or parameter number  |
| <b>TAG_NumbOfByte</b>   | Length in the code tag for read or write procedures. For the jobs 1 (read), 2 (write), 12 (CRC Init), 32 write constant value, length have to be set there.   |
| <b>WatchdogTime</b>     | Monitoring timer for commands   |

### 3 FB PARAMETER DESCRIPTION

#### 3.3 Output parameter

|                       |   |
|-----------------------|---|
| <b>Ready</b>          | Job completed<br>This bit is set when the job was completed. This output will be reset by a rising edge of <b>Start</b> or <b>Reset</b> input.  |
| <b>Error</b>          | Job completed with error<br>This bit is set if the job was completed with an error and is reset with a rising edge at <b>Reset</b> or <b>Start</b> input.   |
| <b>ErrorCode</b>      | If the <b>Error</b> bit is set, the error number will be displayed here as hex value.   |
| <b>MT</b>             | Notification <b>Multiple Tags</b> are detected, more than one data carrier in range of antenna.   |
| <b>DatCarrPresent</b> | Data carrier present / data valid.<br>This bit is only true when a tag is activated from processor. A positive edge of the codetag present signal means data are available starting with address 0 of the code tag in the input buffer of the instance data module without requiring that a read request be initiated. The length of data to be read, is the buffer size of read/write head minus 2 (bit headers). <b>Notice for VU R/W heads:</b> After the Carrier follow-up time the bit will Change to false, even a tag is in the active range of the antenna. |

#### 3.4 General error codes

| Error No.         | Meaning   | Effect   | Remedy   |
|-------------------|---|--|--|
| 00 <sub>hex</sub> | No error  |  |  |
| 01 <sub>hex</sub> | No data carrier in range of antenna             | depends on parameter <b>Dy-namic</b>   | Check distance between code tag and read/write head  |
| 02 <sub>hex</sub> | Read error                                      | Command canceled. Processor- and FB go to base state.  | Check distance between code tag and read/write head  |
| 03 <sub>hex</sub> | Read canceled because data carrier was removed  | Command canceled. Processor- and FB go to base state.  | Check distance between code tag and read/write head. and read/write head. For dynamic mode: Check velocity |
| 04 <sub>hex</sub> | Write error                                     | Command canceled. Processor- and FB go to base state<br>Command<br><b>Caution:</b> Some data may have already been written to the code tag | Check distance between code tag and read/write head  |
| 05 <sub>hex</sub> | Write canceled because data carrier was removed | Command canceled. Processor- and FB go to base state<br>Command<br><b>Caution:</b> Some data may have already been written to the code tag | Check distance between code tag and read/write head. and read/write head. For dynamic mode: Check velocity |



## Function Block description for BIS V

### 3 FB PARAMETER DESCRIPTION

| Error No.         | Meaning   | Effect  | Remedy  |
|-------------------|---|---|---|
| 07 <sub>hex</sub> | Wrong command identifier ( <b>Job</b> ) or number of bytes for read/write command is 0.   | Processor- and FB go to base state.                   | Check parameter settings  |
| 09 <sub>hex</sub> | Cable break on selected read/write head, r/w head not connected or r/w head defective.    | Command canceled. Processor- and FB go to base state. | Check r/w head  |
| 0D                | Communication to the R/W head disrupted.  | Command canceled. Processor- and FB go to base state. | Check r/w head  |
| 0E <sub>hex</sub> | CRC for the read data and CRC for the data carrier do not agree.                          | Command canceled. Processor- and FB go to base state. | Check data carrier  |
| 0F <sub>hex</sub> | Bit headers are not equal   | Processor and FB go to base state.                    | Check programming and content of bitheaders, I/O Addresses correct. |
| 20 <sub>hex</sub> | Address assignment of the read/write job is outside the memory range of the data carrier. | Processor and FB go to base state.                    | Check programming   |
| 21 <sub>hex</sub> | This function is not possible for this data carrier                                       | Processor and FB go to base state.                    | Check data carrier  |
| 33 <sub>hex</sub> | VU message: Password invalid.   | Processor and FB go to base state.                    | Set correct password  |
| 34 <sub>hex</sub> | VU message: Memory area is locked.  | Processor and FB go to base state.                    | Unlock Memory or tag perm-locked                                    |
| 35 <sub>hex</sub> | VU message: Value range of the parameter incorrect.                                       | Processor and FB go to base state.                    | Check program parameters  |
| 36 <sub>hex</sub> | VU message: Data Carrier selection error  | Processor and FB go to base state.                    | Select data carrier, restart command                                |

This error list is corresponding to the status codes in user's manual.

### 3 FB PARAMETER DESCRIPTION

#### 3.5 FB internal error codes

| Error No.         | Meaning                            | Effect                            | Remedy                                   |
|-------------------|------------------------------------|-----------------------------------|--|
| 30 <sub>hex</sub> | Monitoring time expired            | Processor and FB go to base state | Check programming                        |
| 31 <sub>hex</sub> | Undefined command                  | Processor and FB go to base state | Check programming                        |
| 32 <sub>hex</sub> | Wrong Index for select EPC command | Processor and FB go to base state | Check programming Limit between 1 and 25 |

#### 3.6 Description of commandos

The commandos are selected by a hexadecimal value at the “**Command**” input. With a rising edge at “**Start**” input the commando is executed. After successful execution the “**Ready**” Output is true and “**Error**” is false.

##### Read data carrier 01<sub>hex</sub>:

Data carrier is read from “**TAG\_StartAddr**”. The amount of data is defined by the parameter “**TAG\_NumbOfByte**”. The data are stored in “**DB\_Receive**”. The byte offset is defined by the parameter “**Offset\_DBReceive**”.

##### Write data carrier 02<sub>hex</sub>:

The data are read out of “**DB\_Send**” and written to carrier at the byte “**TAG\_StartAddress**”. The amount of data is defined by the parameter “**TAG\_NumbOfByte**”.

##### Store start address for “Auto Read” function 07<sub>hex</sub>:

The “Auto Read” start address is stored in the processor EEPROM. The “Auto Read” start address is defined by the parameter “**TAG\_StartAddress**”.

##### Type and serial number 09<sub>hex</sub>:

Read the read/write head type, data carrier type and UID of data carrier in the field. The data are stored in “**DB\_Receive**”. The ReadByte [0] contains the UID length information, ReadByte [1] contains the head type, ReadByte [2] contains the data carrier type, ReadByte [3..n] contains the UID. The amount of bytes stored in ReadByte[0] are transferred to data-block.

##### Initialize CRC 16 data check 12<sub>hex</sub>:

The data are read out of “**DB\_Send**” and written to carrier at the byte “**TAG\_StartAddress**” with CRC\_16 checksum. The amount of data is defined by the parameter “**TAG\_NumbOfByte**”. Parameter CRC must be selected for data carrier initialization, otherwise the command behaves the same as 02<sub>hex</sub> write data carrier.

##### Write constant value to data carrier 32<sub>hex</sub>:

Constant values are written to data carrier the parameter for start byte on tag is “**TAG\_StartAddress**”. The amount of constant values is defined by the parameter “**TAG\_NumbOfByte**”. The data byte for constant value is read from “**DB\_Send**”.

Please refer to BIS V-61\*\* or BIS VU manual for further information.

## 4 DIACLAIMER OF LIABILITY

This demo function block is free of charge and is a universal application example. This demo function block shall help program and configure PLC applications and shall provide possible solutions.

The user is not entitled to claim for warranty, error correction and updates. In particular there is excluded any claims against Balluff GmbH for damages that might result from the use of this demo program. Excluded from this limitation of liability shall be (a) those damages that are based on injury to life, limb or health, (b) a liability according to the Produkthaftungsgesetz (German Product Liability Law) and (c) cases of willful intent.

Please check if the function block is intended for your application before adapting it in plants and machineries.

By using the S7 sample, made available free of charge you accept the limitation of warranty and liability!

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