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Logging User Data by means of RFID (Set 13)

SIMATIC S7-1200 + RF120C
Extension of Set 6

http://support.automation.siemens.com/WW/view/en/96784939

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1 Task

Note

This set is an extension of set 6 (quality assurance by means of weighing, control and logging).
A RFID reader is to be connected to set 6. The packaged goods from set 6 are provided with a transponder on which the product information can be written and also read out.

Further information on set 6 (quality assurance by weighing, control and logging can be found in entry ID 82454336.

Introduction

In the packaging industry, containers, provided with RFID transponders are to be filled with a specified number of pieces (e.g. of wall anchors), calculated by weight control.

The goods to be packaged are selected via recipes.

After finishing the packaging, a quality assurance takes place.
The packaged goods will pass the quality control if the filling weight is within the tolerance to be observed (specified in the recipe), if not, it will not pass.

In the course of this quality assurance measure, the goods are to be clearly identified and all relevant data, including time stamp are to be logged.

Through a connected RFID reader, the log data is to be additionally written onto the transponder on the containers for later tracking.

The unique serial number UID (unique identifier) of the transponder is to be read out and written into the logging of the process data (DataLog).

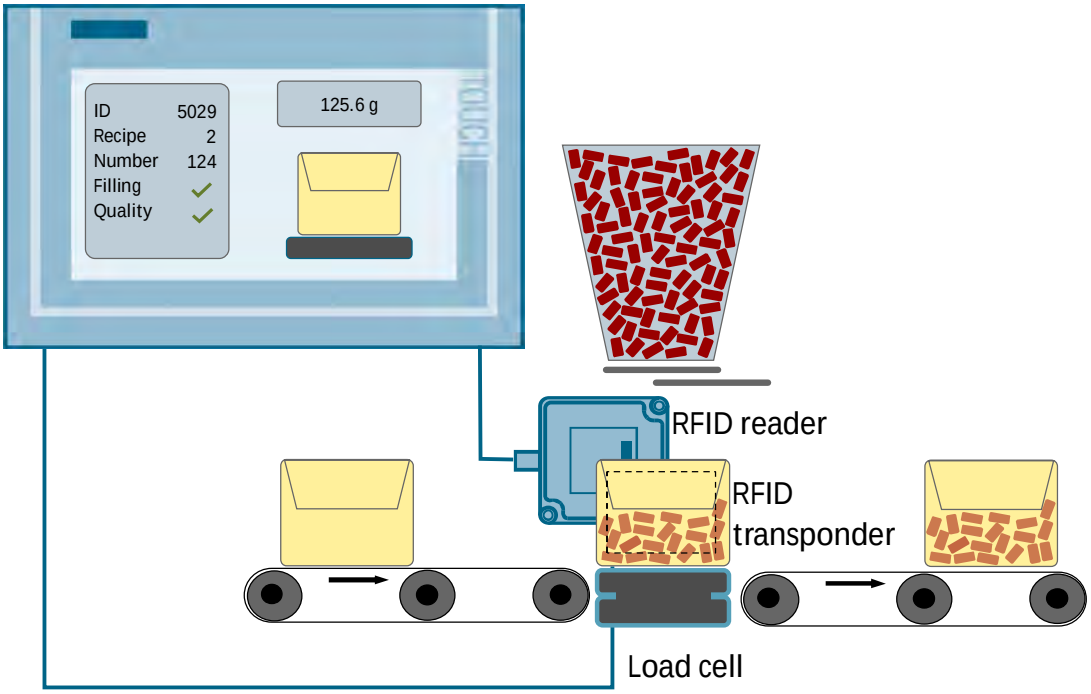
However, the filling process also has to be guaranteed when the transponder in not detected and the produced goods are to be transported and the RFID access error signaled.

The RFID functionality is to be controlled manually even without filling process.

Overview of the automation task

The figure below provides an overview of the automation task.

Figure 1-1



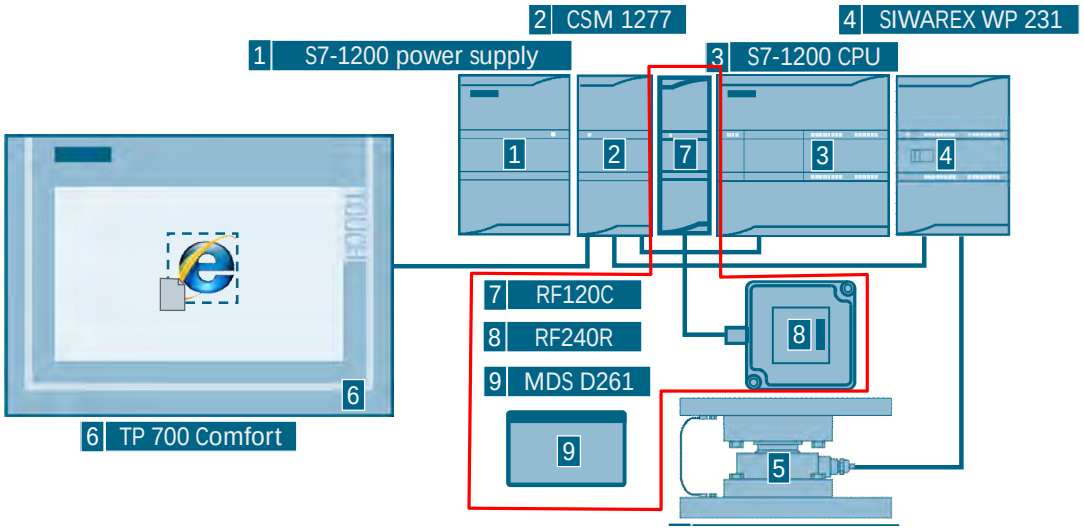
2 Solution

2.1 Overview

Schematic layout

The following figure schematically shows the most important components of the solution:

Figure 2-1



Set 6 uses an **S7-1200 controller** and the **SIWAREX MS weighing module WP231** with **WL260 load cell.** The weight value of the goods to be packaged is detected and compared with a reference value of one of the recipe data. After filling, it is checked whether all components are complete. The packaged goods can be clearly identified by a batch number.

The DataLog function of the **S7-1200 controller** makes it possible to log the currently measured weight values with a time stamp in the flash memory of the CPU.

The application can be operated and monitored via the **TouchPanel TP 700 Comfort.**

The communication between controller, HMI and programming device takes place through the **Ethernet Switch CSM 1277**.

With the help of the extension set, the UID of the **MDS D261 transponder** on the packaging is read out by means of the **communication module RF120C** and the **RFID reader RF240R** and integrated into the process data logging.

In addition to the recipe data with time stamp of the filling, weight and quality assurance written in the load memory of the controller for logging, this information is also written in the transponder on the packaged goods.

The user data can also be edited without weighing technology extension in manual mode, written on the transponder and read out again.

Application area

The SIMATIC S7-1200 controller with the RF120C communication module was developed for all simple controller tasks with identification jobs.

The design technology of the S7-1200 is designated for the control cabinet with protection class IP 20.

Main area of application for the SIMATIC RF120C:

- Mechanical engineering, automation systems, conveyor technology
- Auxiliary assembly lines in the automotive industry/suppliers
- Small assembly lines
- Food and packaging industry

Advantages

- With the RF120C all Siemens RFID and code reading systems can be operated directly and very easily on the S7-1200.
- Together with RF200 readers this results in an economical and yet powerful identification solution.
- Fast and simple configuration via TIA Portal V13
- Automated identification solution for tracking and further processing in industrial production
- Direct communication via the backplane bus between CPU and RF120C communication module (no bus connection required)
- The reader connected to the RF120C communication module is selected via the device view in the TIA Portal (none further configuration required)

Delimitation

This application focusses on data logging and acquisition by means of RFID. The data of the filling is written on the containers and read out again.
It is assumed that the transponder is already located on the container.

This application does not contain a description of:

- Labeling of the container with adhesive transponders

Assumed knowledge

Basic knowledge of SIMATIC S7-1200 and the TIA Portal is assumed.

2.2 Hardware and software components

2.2.1 Validity

This application is valid for

- STEP 7 V13 (\9\) Update 1 (\11\)
- WinCC Comfort V13 (\10\) Update 1 (\11\)
- CPU 1214C Firmware V4.0 (\12\)

2.2.2 Components used

The application was created with the following components:

Hardware components

Table 2-1

Component	No.	Article number	Note
Power supply PM 1207	1	6EP1332-1SH71	Supplies the components with 24V DC
CSM 1277	1	6GK7277-1AA10-0AA0	Ethernet switch
CPU 1214C DC/DC/DC	1	6ES7214-1AG40-0XB0	S7-1200 controller Firmware: V4.0.0
SIWAREX WP 231	1	7MH4960-2AA01	Weighing module Firmware: V1.1.0
SIWAREX WL 260 load cell	1	7MH5102-1KD00	Rated load: 3 kg
SIMATIC HMI TP700 Comfort	1	6AV2124-0GC01-0AX0	Control panel
RFID communication module RF120C for SIMATIC S7-1200	1	6GT2002-0LA00	1 Reader connectable via RS422
Connecting cable between RF120C and RFID reader	1	6GT2091-4LH20	can be assembled, Length 2 m
SIMATIC RF200 READER RF240R	1	6GT2821-4AC10	With RS422 interface and integrated antenna
HF LABEL MDS D261 FOR RF200/RF300 ISO/MOBY D	Minimum order quantity: 1000	6GT2600-1AA01-0AX0	ISO adhesive, 256 BYTE user memory; Dimensions (L x W x H) 55 x 55 x 0.3 mm

Accessorial equipment

Table 2-2

Component	No.	Article number	Note
SIMATIC NET, IND. ETHERNET TP CORD RJ45/RJ45, CAT 6, TP CABLE 4X2, PREPARED WITH 2 RJ45 CONNECTORS, ... 0.5M 1M 2M 6M 10M	4	6XV1870-3Q... ...E50 ...H10 ...H20 ...H60 ...N10	Ethernet cable
Standard mounting rail 35mm	1	6ES5 710-8MA11	483 mm

Software components

Table 2-3

Component	No.	Article number	Note
STEP 7 Basic V13	1	6ES7822-0AA03-0YA5	Configuration and programming of the SIMATIC S7-1200
WinCC Comfort V13	1	6AV2101-0AA03-0AA5	Configuration and programming of the TP 700 Comfort

Example files and projects

The following list includes all files and projects that are used in this example.

Table 2-4

Component	Note
96784939_S7-1200_RF120C_Set13_CODE_v1d1.zip	This zip file contains the TIA Portal project.
96784939_S7-1200_RF120C_Set13_DOKU_v1d1_en.pdf	This document.

3 Basics

This application is based on set 6 (\16\).
Apart from the RF120C communication module for the SIMATIC S7-1200, the combination from the RFID reader and compatible transponders plays a decisive role. The combinations differ by:

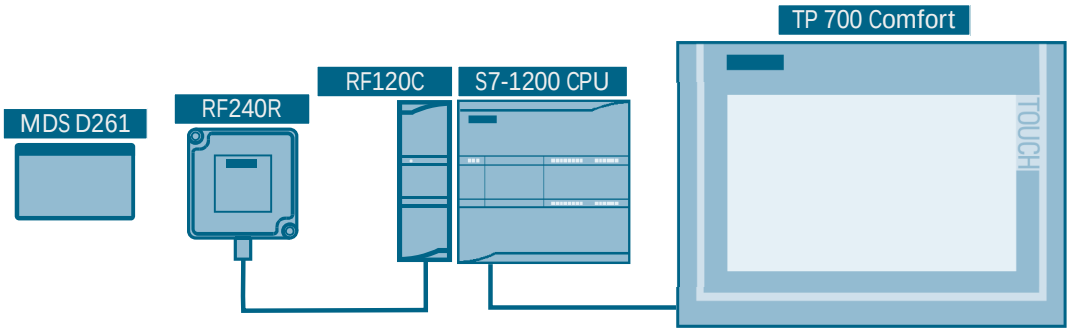
- Technology used/logs of the air interface
- Simultaneous detection of several transponders (multitag) required/reach of the transponder detection (read/write)
- Size of the user memory on the transponder/data transmission rate
- Size of reader and transponder
  …

As an economical variant the SIMATIC RF240R reader was selected in connection with the adhesive SmartLabel transponder MDS D261.
The compatibility of the combination of RFID reader and transponder can be found in the SIMATIC RF Configuration Guide (\5\).

3.1 Communication module SIMATIC RF120C

The SIMATIC RF120C is a communication module for the direct connection of the SIMATIC Identif systems to the S7-1200.
All RFID systems as well as the MV400 code reader system can be operated on the SIMATIC RF120C.

Figure 3-1



Only one reader or one code reading device can be operated with a RS422 interface on a RF120C communication module.
Thus, a S7-1200 CPU each can be operated with a maximum of 3 readers (3 communication modules RF120C with one reader each).
RFID and code reading device from the following product families can be operated with the RF120C:

- RF200
- RF300
- RF600
- MV400 code reading devices
- MOBY D
- MOBY U

Further information on the RF120C communication module can be found in the "SIMATIC Ident RFID communication module RF120C" Operating Instructions (\8\).

A library with newly developed instructions (function blocks) allows for simple programming and commissioning in the TIA Portal (\6\).

3.2 RFID Reader RF240R

The SIMATIC RF620R reader is a reader with integrated antenna.
Its compact design makes it especially suitable for the use in small assembly lines.
It is supplied with voltage from the RF120C communication module.

The reader has an optional RS422 or RS232 interface.
For the connection to the RF120C communication module the variant with the RS422 interface is selected.

Due to its high protection type (protection type IP67) and robust design technology, the reader enables the SIMATIC RF240R for trouble-free use even under the toughest industrial conditions. The connection will be realized via an 8-pole M12 connector.

The RF240R has a 2-color LED via which operator voltage, presence and errors are signaled. The errors can be acknowledged with the respective configuration settings of the RF120C via the “Reset_Reader” function block (see chapter 5.2).

The reader is operated with ISO 15693 compatible transponders and supports the single tag mode (only one transponder may be located in the detection range of the reader).

For more information on the RFID reader RF240R please refer to \7\.

3.3 ISO transponder MDS D261

The MDS D261 is a SmartLabel transponder (self-adhesive label).
It can be used for the MOBY D RFID system as well as for the SIMATIC RF200 and SIMATIC RF300 (ISO mode).

SmartLabels allows for a variety of flexible constructions to guarantee ideal dimensioning for the various applications.

Being very economically priced, SmartLabels can generally be used as “electronic barcode substitute” or “accompanying documents”.

In connection with the RFID reader RF240R the MDS D261 transponder is detected at a distance of 2…60 mm (\5\).

It has a 256 bytes EEPROM user memory.
Apart from this freely available memory area for user data, each ISO transponder chip has a unique 8 byte serial number (UID, read only).

Table 3-1

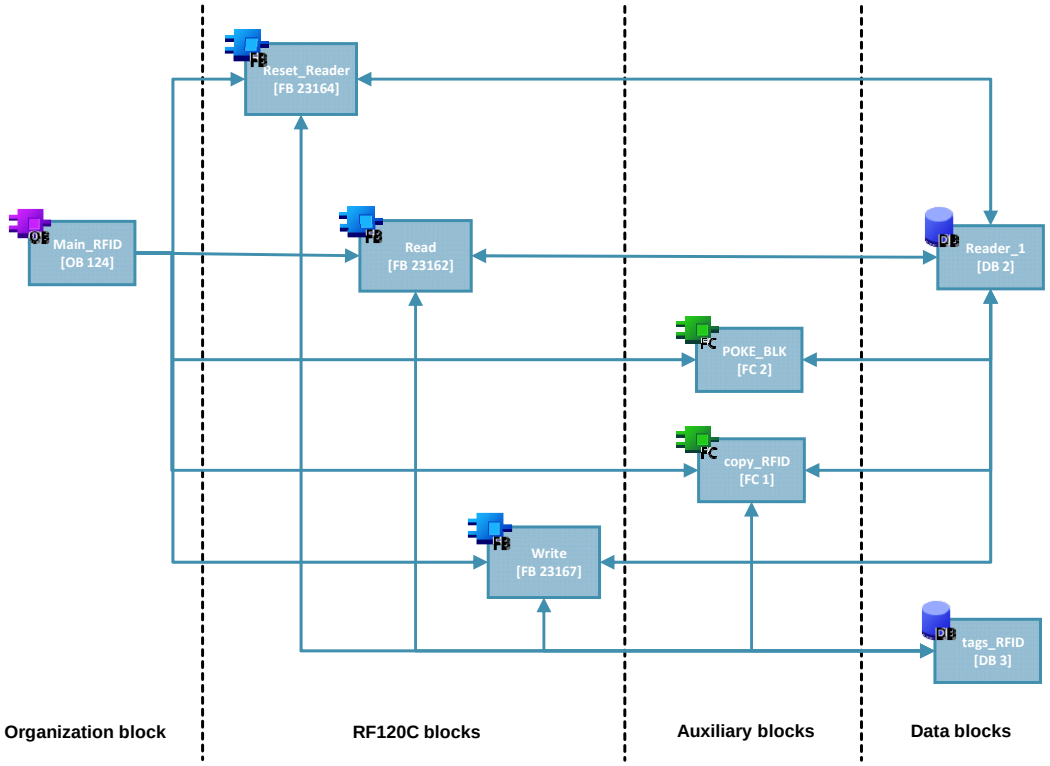
Memory area	Size	Start address:	End address	Access
UID	8 Byte	FFF0	FFF8	Read only
User area	256 bytes	0000	00FF	EEPROM (Read/write)

4 Mode of Operation

Below, the blocks used are introduced and the most important interface parameters are described.

4.1 General overview

Figure 4-1



4.2 Organization block

The organization block determines the processing sequence of the instructions and transfers the tags from the data blocks to the block interfaces.

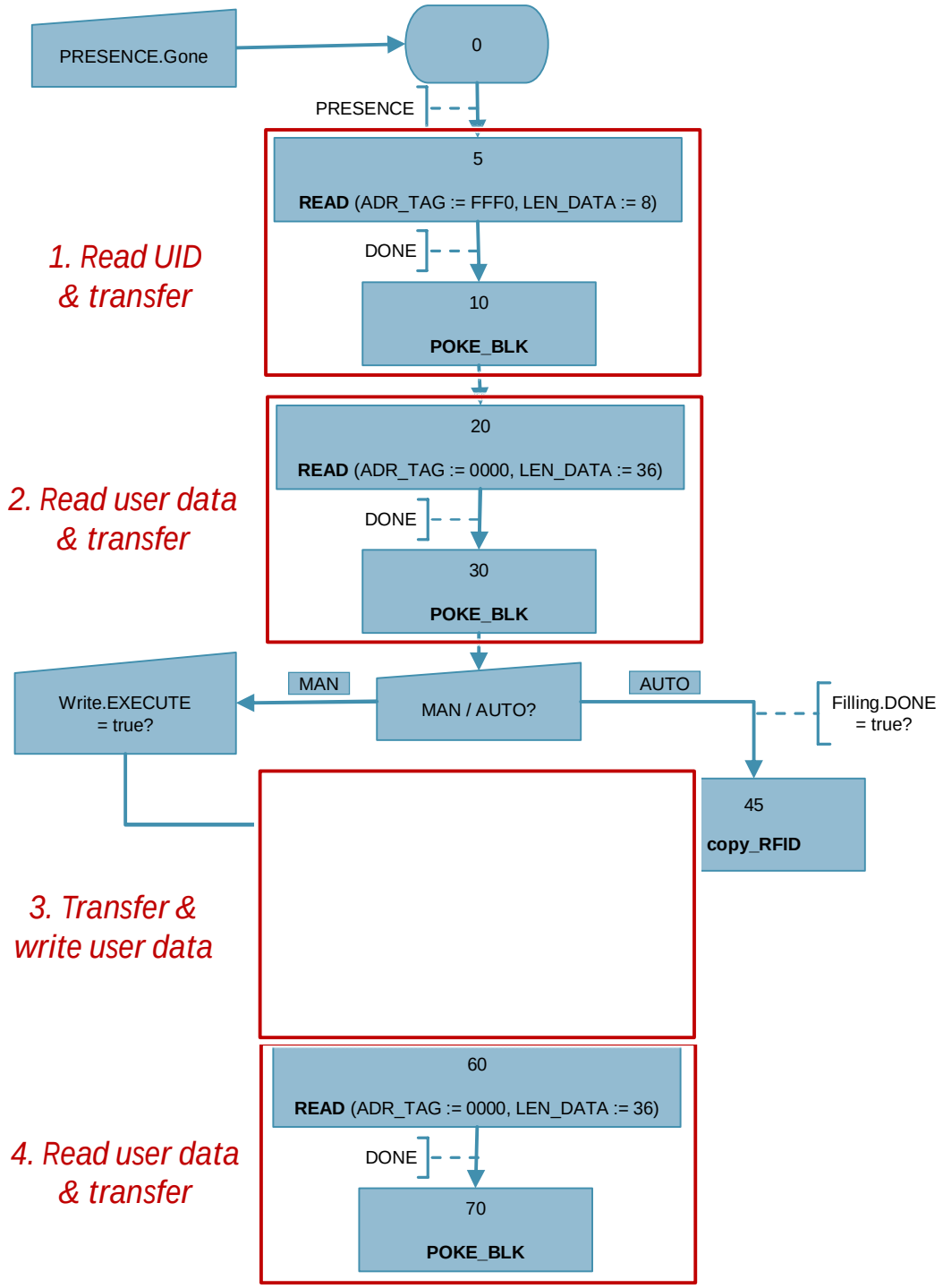
4.2.1 OB “Main_RFID”

The function blocks for the RF120C communication module, as well as the auxiliary blocks. are called from the OB “Main_RFID”.

Program flow chart

The OB “Main_RFID” is programmed as a sequence. The program flow chart is as follows.

Figure 4-2



The sequence consists of 4 accesses on the transponder:

1. Reading the UID and copying the data (when detecting the transponder)
2. Reading the user data area and interpreting the data
3. Copying the user data to be written and writing to the transponder
4. Repeated reading out of the user data area to check the successful write process

Depending on the selection of manual or automatic mode, you can edit the user data to be written via the operator panel or it can be automatically generated via the “copy_RFID” function from the filling process of set 6.

The sequence is reset as soon as the transponder is removed from the detection range of the reader.

4.3 RF120C Ident blocks

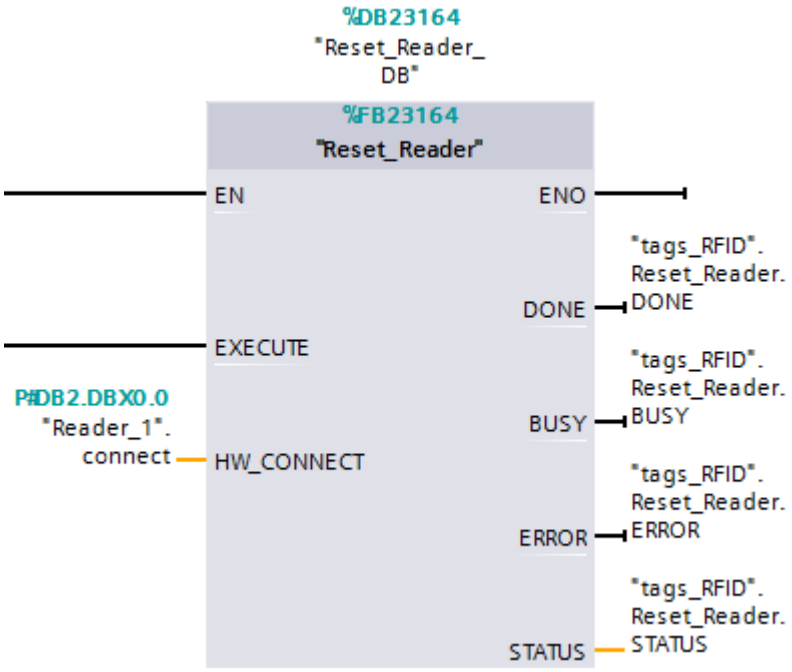
For this application the following blocks from the ident profile library are required for the TIA Portal for the S7-1200 (\6\):

- FB 23164 “Reset_Reader” for the initialization when commissioning and resetting the reader in the event of an error
- FB 23162 “Read” for reading out of the transponder information
- FB 23167 “Write” for writing on the transponder via the RFID reader
- FB 23151 “PIB_1200_UID_001KB” (this block is called from the three other protected RFID function blocks)

4.3.1 FB “Reset_Reader”

With the help of the FB "Reset_Reader" the RFID reader RF120C is reset.
In the process, the reader is reset to the settings that are stored in the device configuration of the RF120C (see chapter 5.2).

Figure 4-3



Interface

Table 4-1

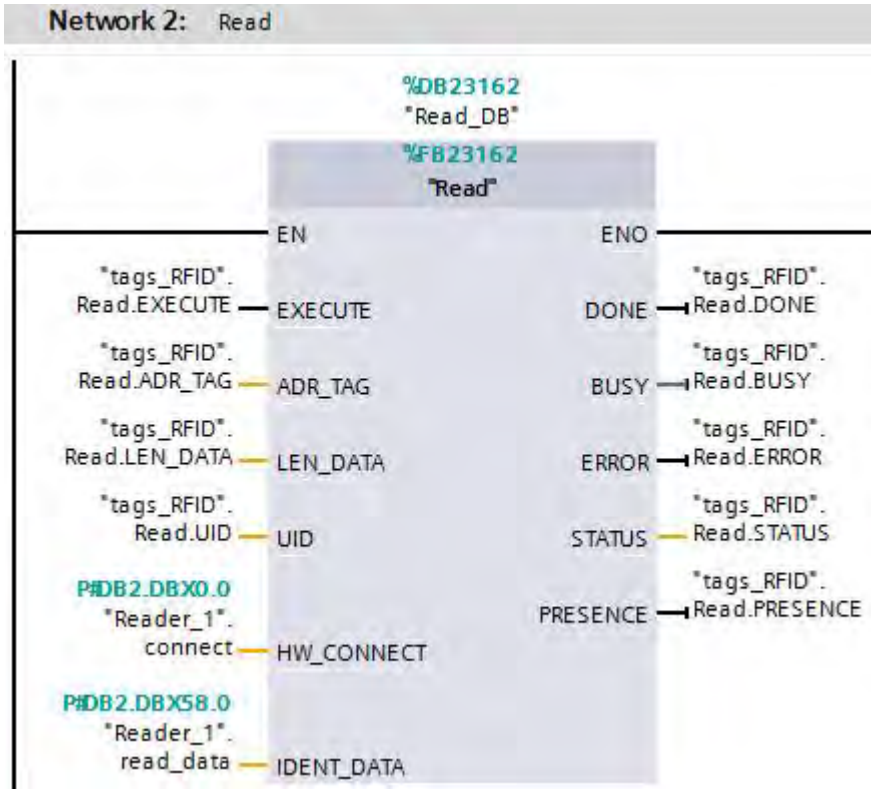
	Name	Data type	Description
Input	EXECUTE	Bool	Rising edge: Command start
Output	DONE	Bool	Error-free execution*
	BUSY	Bool	Command processing
	ERROR	Bool	Error signaling*
	STATUS	DWord	Hexadecimal error code (valid in connection with = true)*
InOut	HW_CONNECT	“HW_CONNECT_VAR”	PLC data type for channel addressing (see chapter 4.5.1)

*) remains pending via EXECUTE till the next execution

4.3.2 FB “READ”

The “Read" block reads the data from the transponder once and provides it in the "IDENT_DATA" buffer. The physical address and the length of the data is transferred via the parameters "ADR_TAG" and "LEN_DATA”. A maximum of 1024 bytes can be read with one job.

Figure 4-4



Interface

Table 4-2

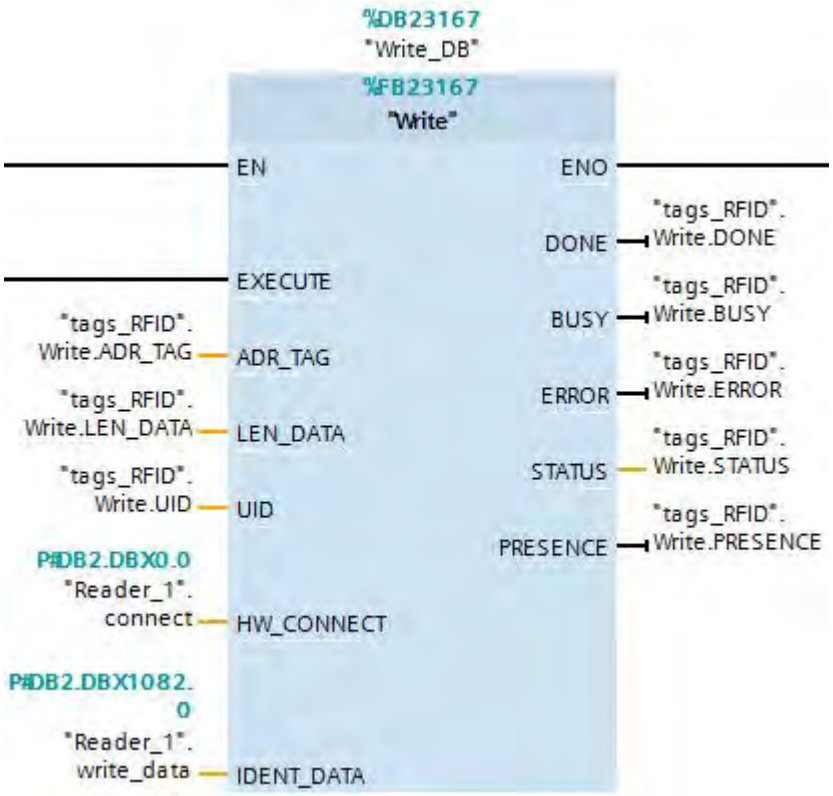
	Name	Data type	Description
Input	EXECUTE	Bool	Rising edge: Command start
	ADR_TAG	Word	Physical address on the transponder, from which on it is read
	LEN_DATA	Int	Length of the data to be read (1...1024 bytes)
	UID	Array[1..8] of Byte	Unique identifier of the transponder RF240R can only do single tag mode (UID = 0).
Output	DONE	Bool	Error-free execution*
	BUSY	Bool	Command processing
	ERROR	Bool	Error signaling*
	STATUS	DWord	Hexadecimal error code (valid in connection with = true)*
	PRESENCE	Bool	Transponder presence
InOut	HW_CONNECT	“HW_CONNECT_VAR”	PLC data type for channel addressing (see chapter 4.5.1)
	IDENT_DATA	Array[1..1024] of Byte	Data buffer where the read data is stored

*) remains pending via EXECUTE till the next execution

4.3.3 FB “Write”

The “Write" block writes the data once from the "IDENT_DATA" buffer onto the transponder. The physical address and the length of the data is transferred via the parameters "ADR_TAG" and "LEN_DATA”. A maximum of 1024 bytes can be written with one job.

Figure 4-5



Interface

Table 4-3

	Name	Data type	Description
Input	EXECUTE	Bool	Rising edge: Command start
	ADR_TAG	Word	Physical address on the transponder, from which on it is written
	LEN_DATA	Int	Length of the data to be written (1 ... 1024 bytes)
	UID	Array[1..8] of Byte	Unique identifier of the transponder RF240R can only do single tag mode (UID = 0).
Output	DONE	Bool	Error-free execution*
	BUSY	Bool	Command processing
	ERROR	Bool	Error signaling*
	STATUS	DWord	Hexadecimal error code (valid in connection with = true)*
	PRESENCE	Bool	Transponder presence
InOut	HW_CONNECT	“HW_CONNECT_VAR”	PLC data type for channel addressing (see chapter 4.5.1)
	IDENT_DATA	Array[1..1024] of Byte	Data buffer with data to be written

*) remains set, up to the next execution via EXECUTE

Note Further information of the blocks used can be found in the “SIMATIC Ident RFID systems Communications module RF120C with application blocks for S7-1200 and S7-1500” Operating Instructions (\8\).

4.4 Auxiliary blocks

The following auxiliary blocks are used in this application:

- FC 2 “POKE_BLK” to copy the structured user data in an array of byte and vice versa
- FC 1 “copy_RFID” to collect all relevant user data that are to be written on the transponder

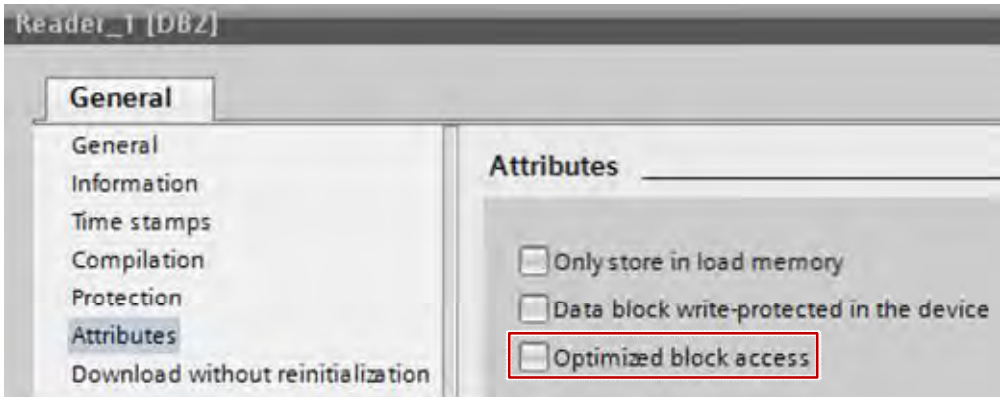
4.4.1 Function “POKE_BLK”

The FC “POKE_BLK” is only the SCL instruction “POKE_BLK” as function in the programming language ladder diagram (LAD) or function block diagram (FBD).

This function is required to enable the transfer between the “IDENT_DATA” of the FBs “Read” and “Write” as array of byte and of the data structure to be interpreted.

This block accesses the “Reader_1” data block absolute.
For this reason the “Optimized block access” must not be enabled in the properties of the DB “Reader_1”.

Figure 4-6



Interface

Table 4-4

	Name	Data type	Description
Input	dbNumber	DInt	Number of the data block (source and target memory area)
	byteOffset_src	DInt	Start address of the source memory area
	byteOffset_dest	DInt	Start address of the target memory area
	count	DInt	Number of bytes to be copied

The call of FC2 is always in connection with the RFID instructions “Read” or “Write”.
In the case presented in Figure 4-7, for example, the read out 36 bytes of user data from the transponder is copied into the data structure “RFID_DATA_read” of the “UDT_RFID_DATA” PLC data type:

Figure 4-7

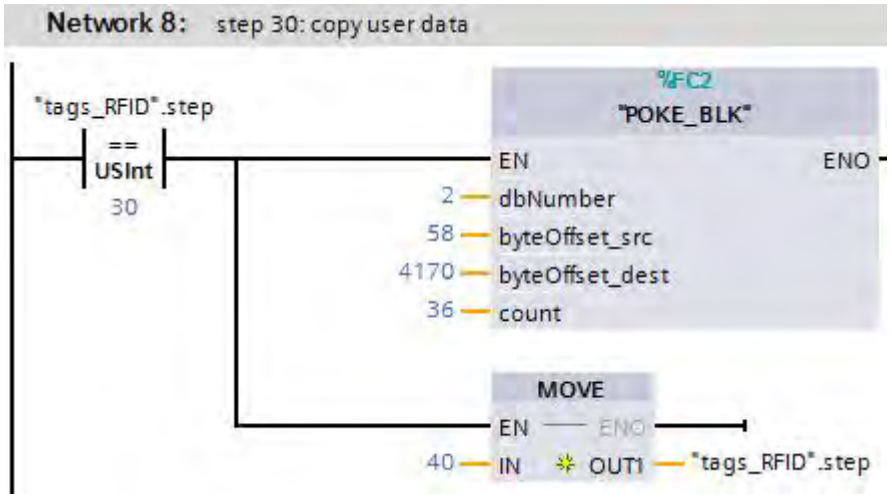


Figure 4-8

Reader_1

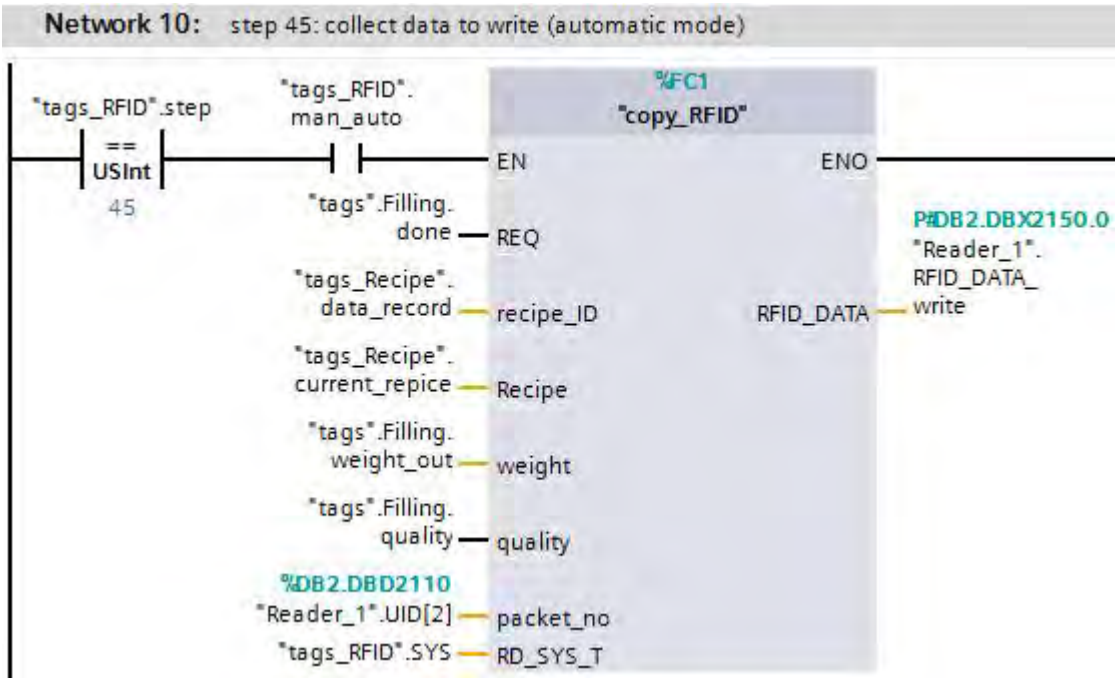
		Name	Datentyp	Offset
1		Static		
2		connect	"HW_CONNECT_VAR"	0.0
3		read_data	Array[1..1024] ...	58.0
4		write_data	Array[1..1024] of Byte	1082.0
5		advanced_cmd	Struct	2106.0
6		UID	Array[1..2] of DWord	4162.0
7		RFID_DATA_read	"UDT_RFID_DATA"	4170.0
8		packet_no	UDInt	0.0
9		date&time	DTL	4.0
10		recipe_ID	UInt	16.0
11		diameter	USInt	18.0
12		piece_weight	Real	20.0
13		quantity	UInt	24.0
14		tolerance	Real	26.0
15		weight	Real	30.0
16		quality	Bool	34.0
17		RFID_DATA_write	"UDT_RFID_DATA"	4206.0

4.4.2 Function “copy_RFID”

The FC “copy_RFID” collects all required user data that is to be written on the transponder in automatic mode and stores it in a data buffer. It consists of the data that is recorded at the process value logging via DataLogging and the time stamp of the recording.

The call of the FC “copy_RFID” is done in OB “Main_RFID”.

Figure 4-9



Interface

Table 4-5

	Name	Data type	Description
Input	REQ	Bool	Copy request (enabled when REQ = true)
	recipe_ID	UInt	Recipe ID (identical with the recipe data record number)
	Recipe	"UDT_Wall_anchors"	Recipe data (see Table 4-6)
	weight	Real	Filled weight
	quality	Bool	Quality of filling
	packet_no	UDInt	Packet number (low-order DWord of the read-out UID in decimal format)
Output	RFID_DATA	"UDT_RFID_DATA"	Summary of the RFID data to be written (see Table 4-7)
InOut	RD_SYS_T • SYS_T • RET_VAL	Struct DTL Int	Output tag of the “RD-SYS_T” instruction (read time)

PLC data type "UDT_Wall_anchors"

The "UDT_Wall_anchors" PLC data type includes the elements of a recipe data record.

Table 4-6

Name	Data type	Description
productname	String[20]	Name of the recipe data record
diameter	USInt	Wall anchor diameter in mm
quantity	UInt	Pieces
piece_weight	Real	Individual weight (unit depends on the “Quick Start” configuration)
tolerance	Real	Tolerance (unit depends on the “Quick Start” configuration)

PLC data type "UDT_RFID_DATA"

The "UDT_RFID_DATA" PLC data type includes all process data that is to be written onto the transponder.

Table 4-7

Name	Data type	Description
packet_no	UDInt	Packet number (identical with count value of the filling)
date&time	DTL	System time stamp of filling
recipe_ID	UInt	Recipe ID (identical with the recipe data record number)
diameter	USInt	Wall anchor diameter in mm
piece_weight	Real	Individual weight (unit depends on the “Quick Start” configuration)
quantity	UInt	Pieces
tolerance	Real	Tolerance (unit depends on the “Quick Start” configuration)
weight	Real	Filled weight
quality	Bool	Quality of filling

4.5 Data blocks

The following data blocks are used in the application:

- DB 2 “Reader_1” (FB 12)
- DB 124 “tags_RFID” (DB 10)

4.5.1 Data block “Reader_1”

The “Reader_1” data block includes the configuration data for the RC120C communication module as well as the data buffer to read out and write to the transponder.

Table 4-8

Name	Data type	Offset	Description
connect	“HW_CONNECT_VAR”	0.0	Configuration data for transfer to the RFID blocks

Name	Data type	Offset	Description
read_data	Array[1..1024] of Byte	58.0	Receive data buffer for the FB “Read”
write_data	Array[1..1024] of Byte	1082.0	Send data buffer for the FB “Write”
UID	Array[1..2] of DWord	2106.0	Unique identifier of the transponder
RFID_DATA_read	"UDT_RFID_DATA"	2114.0	Read structured user data
RFID_DATA_write	"UDT_RFID_DATA"	2150.0	Structured user data to be written

PLC data type “HW_CONNECT_VAR”

The “HW_CONNECT_VAR" PLC data type includes configuration data for the physical addressing of the communication module and reader to be used and servers for the synchronization of the function blocks when accessing the reader (see chapter 5.2).

Table 4-9

Name	Data type	Description
Address • HW_ID • CM_CHANNEL • LADDR	Struct Word Int DWord	Address structure for identifying the RF120C used Hardware identifier of the communication module Channel selection (RF120C only has one channel; value = 1) I/O address of the communication module
Status	Struct	Internal information (not further explained)
Static	Struct	Internal information (not further explained)

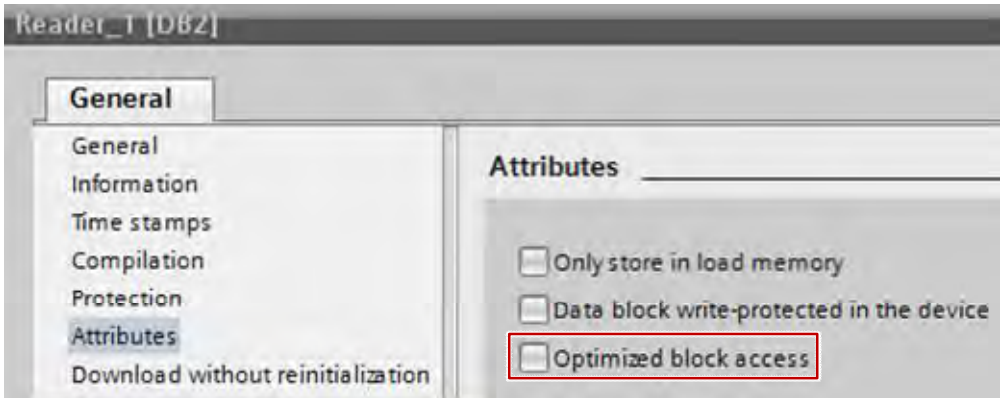
Note

The "HW_CONNECT_VAR" PLC data type is part of the Ident library for the TIA Portal (\6\).

Further information can be found in the “SIMATIC Ident RFID systems Communications module RF120C with application blocks for S7-1200 and S7-1500” Operating Instructions (\8\).

Due to the absolute access to this data block via the “POKE_BLK” function, the “Optimized block access” attribute must not be enabled in the properties of the DB “Reader_1” (see chapter 4.4.1).

Figure 4-10



4.5.2 Data block “tags_RFID”

The “tags_RFID” data block includes the tags for transmitting the function blocks and functions to the interfaces.

The following table shows the tags that have been provided with deviating start values in the example project.

Table 4-10

Name	Data type	Start value	Description
man_auto	Bool	true	Switch-over bit manual/automatic mode (false = manual mode, true = automatic mode)

4.6 Changes in set 6

To secure the filling process in the event of an incorrect transponder access, the program code of set 6 also has to be adjusted.

The transponder has to be located for long enough in the detection range of the reader to read and write the data but it must not hinder the removal of the filled goods.

4.6.1 FB “RFID_timer”

The FB “RFID_timer” intervenes in the block link between the filling process (FB “Filling”) and the removal (FB “HMI”) or the compilation of the DataLog data (FC “copy”) and is called in the OB 1 “Main”.

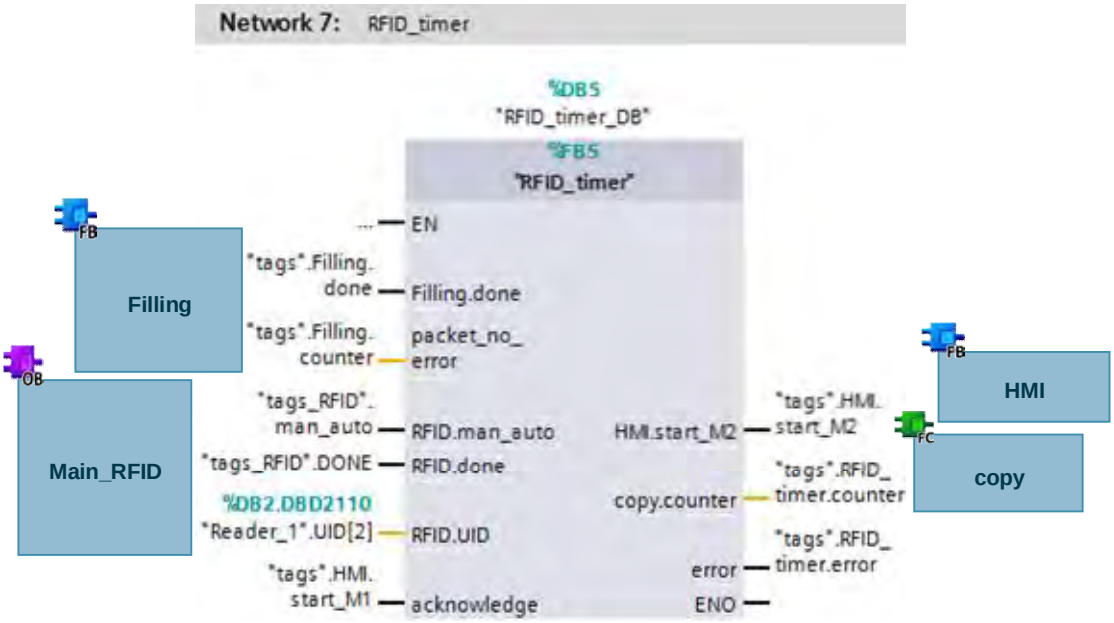
After successful filling (Filling.done) a preset time will pass in automatic mode (RFID.man_auto) (here 1 second) in which the RFID sequence has to be processed successfully (RFID.done).

In a positive case the read out UID (RFID.UID) is copied in the DataLogging data record to be written (copy.counter) and “RFID.done” starts the removal of the packet (HMI.start_M2) as well as the recording of the process data.

In a negative case, the specified “packet_no_error” error number (here the count value of the filling) is copied in the DataLogging data record to be written and the removal of the packet and the recording of the process data starts after the lapsed time. The incorrect access to the transponder is signaled on the “error” output. The “error” output is reset via the “acknowledge” input.

In manual mode (RFID.man_auto = false) the RFID sequence is not time monitored. The writing on the RFID transponder will be started manually. There isn’t a removal or data logging in this case (HMI.start_M2).

Figure 4-11



Interface

Table 4-11

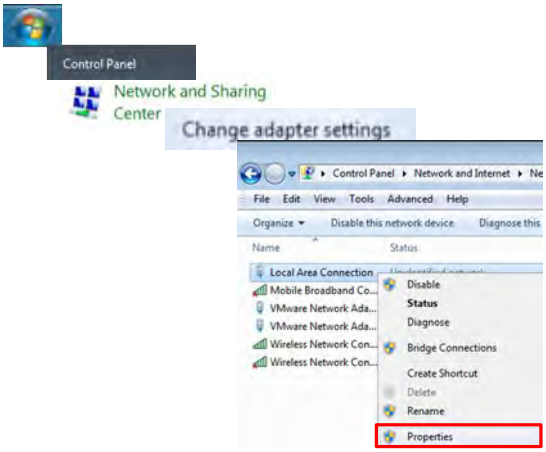
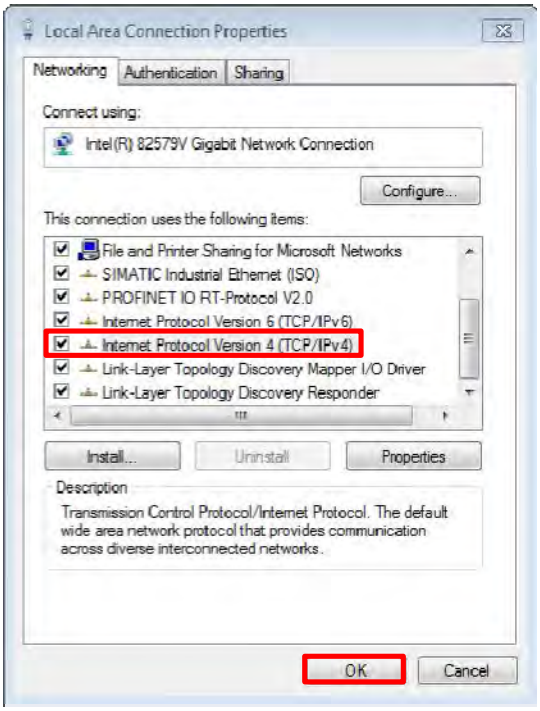
	Name	Data type	Start value	Description
Input	Filling.done	Bool		Successful ending of the filling
	packet_no_error	UDInt	0	Packet no. if the RFID access is incorrect
	RFID.man_auto	Bool		Manual/automatic mode (RFID access)
	RFID.done	Bool		Successful processing of the RFID access
	RFID.UID	UDInt		Low-order DWord of the UID
	acknowledge	Bool		Reset “error” output
Output	HMI.start_M2	Bool		Start request for the removal conveyor belt
	copy.counter	UDInt		Packet no. to be written (DataLog)
	error	Bool		RFID sequence not successfully processed within “time”
Constant	time	Time	1s	Maximum time for processing the RFID sequence

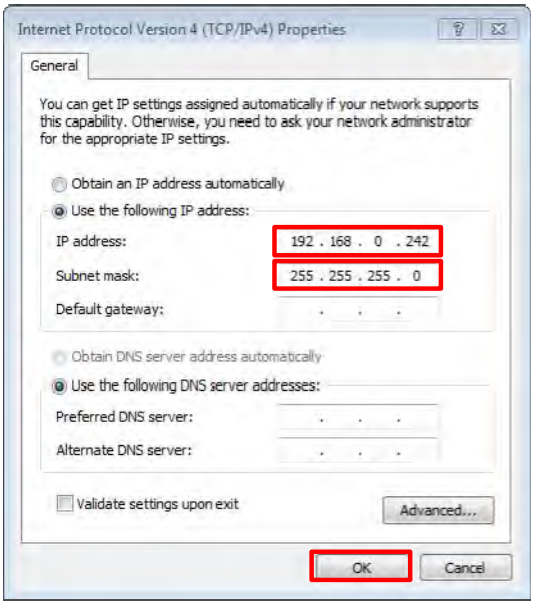
5 Configuration and Settings

5.1 Network connections

The LAN network card of the programming device requires a static IP address to configure the controller and the HMI and to configure the weighing module.
The configuration of the LAN connection is described in the following.

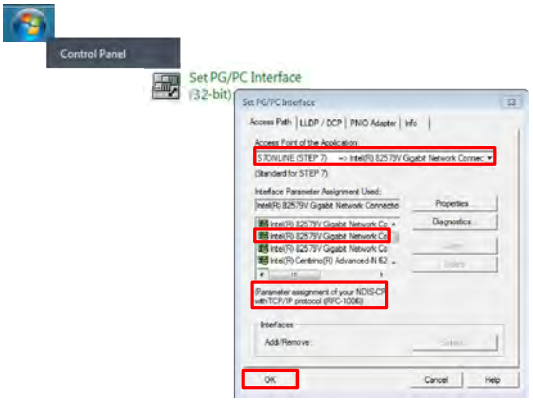
Table 5-1

No.	Action	Comments
1.	Open the network connections via “Start > Control Panel> Network and Sharing > Change adapter settings”. • Select your network connection. • Open the properties via right click.	
2.	Select the “Internet Protocol Version 4 (TCP/IPv4)” element under “Networking” and open its properties.	

No.	Action	Comments
3.	• Select “Use the following IP address”. • Select an IP address that belongs to the subnet mask of the CPU. • Accept the settings by clicking “OK” and “Close”.	

5.1.1 Setting PG/PC Interface

Table 5-2

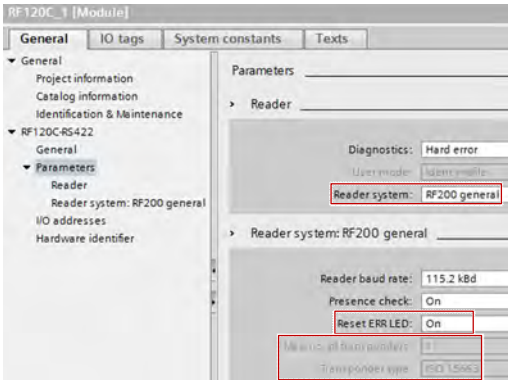
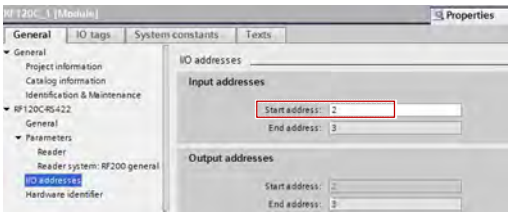
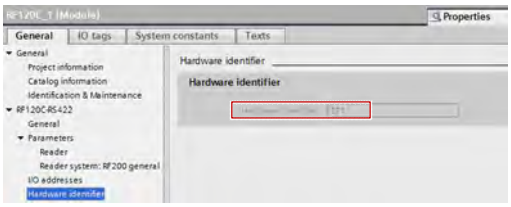
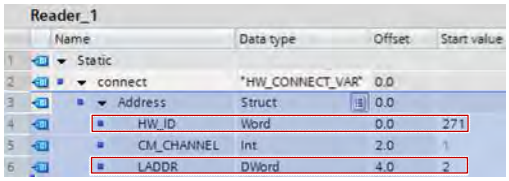
No.	Action	Comments
1.	Open the PG/PC interface settings via “Start > Control Panel” in order to set the correct access path for STEP 7 V13. • Select “S7ONLINE (STEP 7)” as access point of the application. • Select your network card as interface configuration used with “(Parameter assignment of your NDIS-CP with TCP/IP protocol (RFC-1006))”. Apply the settings with “OK”.	

5.2 Configuring communication module RF120C

For the configuration you have to accept the settings in the device view of the RF120C communication module and certain settings in the “Reader_1” data block.

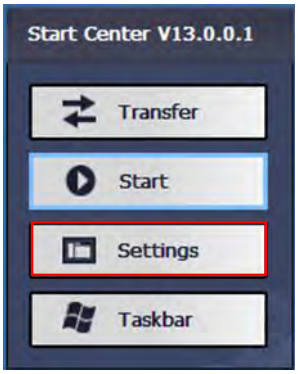
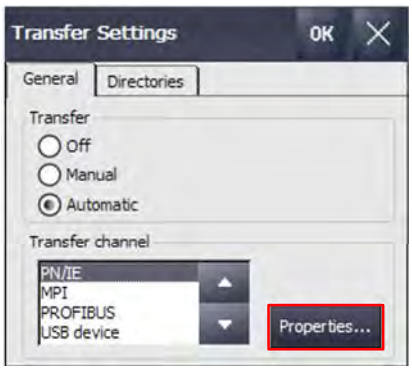
Please proceed as follows:

Table 5-3

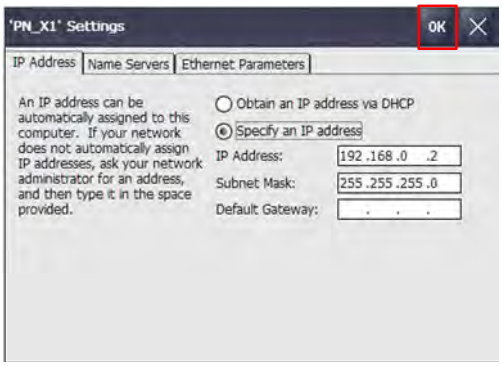
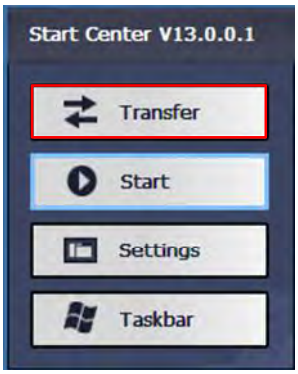
No.	Action	Comments
1.	• Open the device view of the RF120C communication module in the TIA Portal project. • Specify the connected reader system in “Properties>General>RF120C-RS422>Parameter>Reader” (here “RF200 general”). • Switch on the “Reset ERR LED (of the reader via the FB “Reset_Reader”)” option. • For higher reader systems you also have to specify the number of simultaneously detectable transponders as well as the transponder type used.	
2.	• Open the I/O addresses menu item and read the start address of the input addresses.	
3.	• Open the hardware identifier menu item and read out the hardware address of the RF120C communication module.	
4.	• Enter the hardware identifier (step 3) and the start address (step 2) read out as start values of the parameters “HW_ID” and “LADDR” in the “Reader_1” data block.	

5.3 Configuring SIMATIC Panel TP700 Comfort

Table 5-4

No.	Action	Comments
1.	Provide the TP700 Comfort with 24V.	
2.	Click the “Settings” button in the start center after the initialization phase of Windows CE[1].	
3.	Double click the transfer icon in the “Control Panel” settings.	
4.	Select the “PN/IE” transmission channel in “Transfer Settings”. Then click the “Properties…” button.	
5.	You will then get to “Network and Dial-up Connections”. Double click the “PN_X1” icon.	

[1] The "bootloader" initialization phase is followed by a startup delay interval after which an already loaded application starts. You therefore have to click an action in the loader within the startup delay time.

No.	Action	Comments
6.	Enable the “Specify an IP address” checkbox and accept the displayed settings: • IP-Address: 192.168.0.2 • Subnet mask: 255.255.255.0 Finally, accept the settings made in the “PN_X1” and transfer settings with “OK”.	
7.	The transfer mode in the start center has to be enabled to subsequently transfer the HMI project part into the Comfort Panel.	

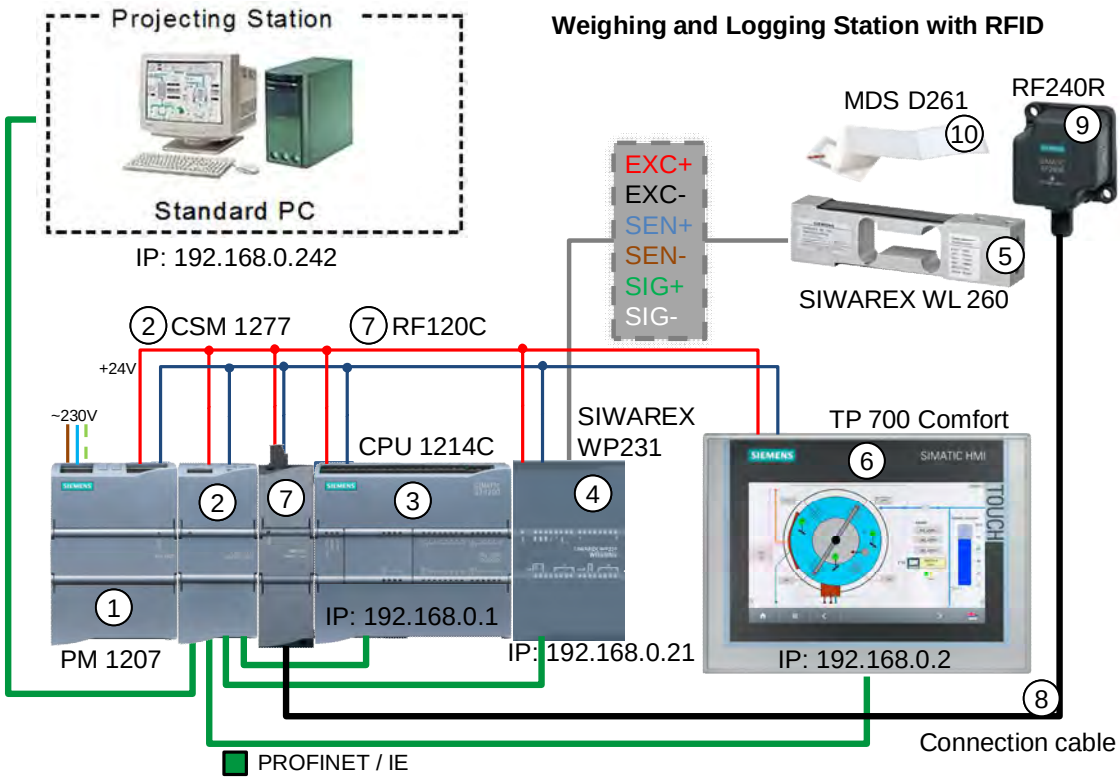
6 Installation and Commissioning

This chapter shows the necessary steps to put the example into operation with the code from the download and the hardware list.

6.1 Installing the hardware

The figure below shows the hardware setup of the application.

Figure 6-1



The set 6 (\16\) is expanded by the components for the RFID connection.

The **CPU 1214C (3)** communicates via the **RF120C module (7)** and the **connecting cable (8)** with the **RFID reader RF240R (9)** and thus reads and writes on the **adhesive ISO transponder MDS D261 (10)**.

The 24V energy supply of the devices is provided by a **PM 1207 (1)**.

A Windows PC with **TIA Portal V13 (STEP 7 Basic V13 and WinCC Comfort V13)** is used as configuration device for the **S7-1200 controller** as well as the **TP 700 Comfort**.

The **Switch CSM 1277 (2)** is used as node for the Ethernet communication between the controller, the **TP 700 Comfort operator panel (6)** and the configuration device.

Table 6-1

No.	Action	Comments
1.	Follow the steps to install the hardware of set 6.	See chapter “Installing the hardware”, source: set 6 (\16\)
2.	Separate the PM1207 power module from the power supply (230V~).	
3.	Connect the RF120C communication module to the left backplane bus interface of the CPU (after having removed the cover).	see Figure 6-1
4.	Provide the communication module with 24V and ground from the PM1207 power module as well as with PE for shielding.	see Figure 6-1
5.	Install the RFID reader in a way, so that the transponder is located in the detection area of 2 to 60 mm from the RF240R reader.	See “SIMATIC RF Configuration Guide” (\5\)
6.	Connect den .RFID reader via the connecting cable with the RF120C communication module.	see Figure 6-1
7.	Provide the PM1207 power module with the power supply (230V~) again.	
8.	Stick the MDS D261 transponder onto the containers to be filled.	

6.2 Software installation (download)

This chapter describes the steps for the installation of the example code.

Note At this point, it is assumed that the necessary software has been installed on your computer and that you are familiar with the software.

Preliminary remarks

For the startup, we offer you software examples with test code and test parameters as a download. The software examples support you during the first steps and tests with set 13. They enable a quick test of hardware and software interfaces between the products described in the set.

The software examples are always assigned to the components used in the set and show their basic interaction. However, they are not real applications in the sense of a technological problem solution with definable properties.

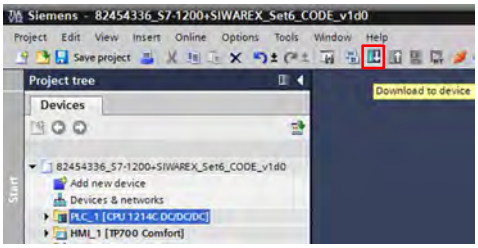
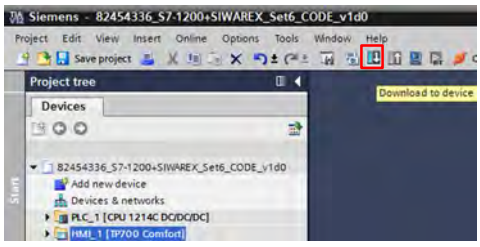
You can operate the project included also as independent RFID application without real SIWAREX connection. The missing module is signaled via the “ERROR” LED to the S7-1200 CPU. However, the RFID functions can still be performed via manual mode (see chapter 7.3.1).

6.3 Downloading the startup code

The software examples are available on the HTML page from which you downloaded this document.

Downloading the TIA Portal project

Table 6-2

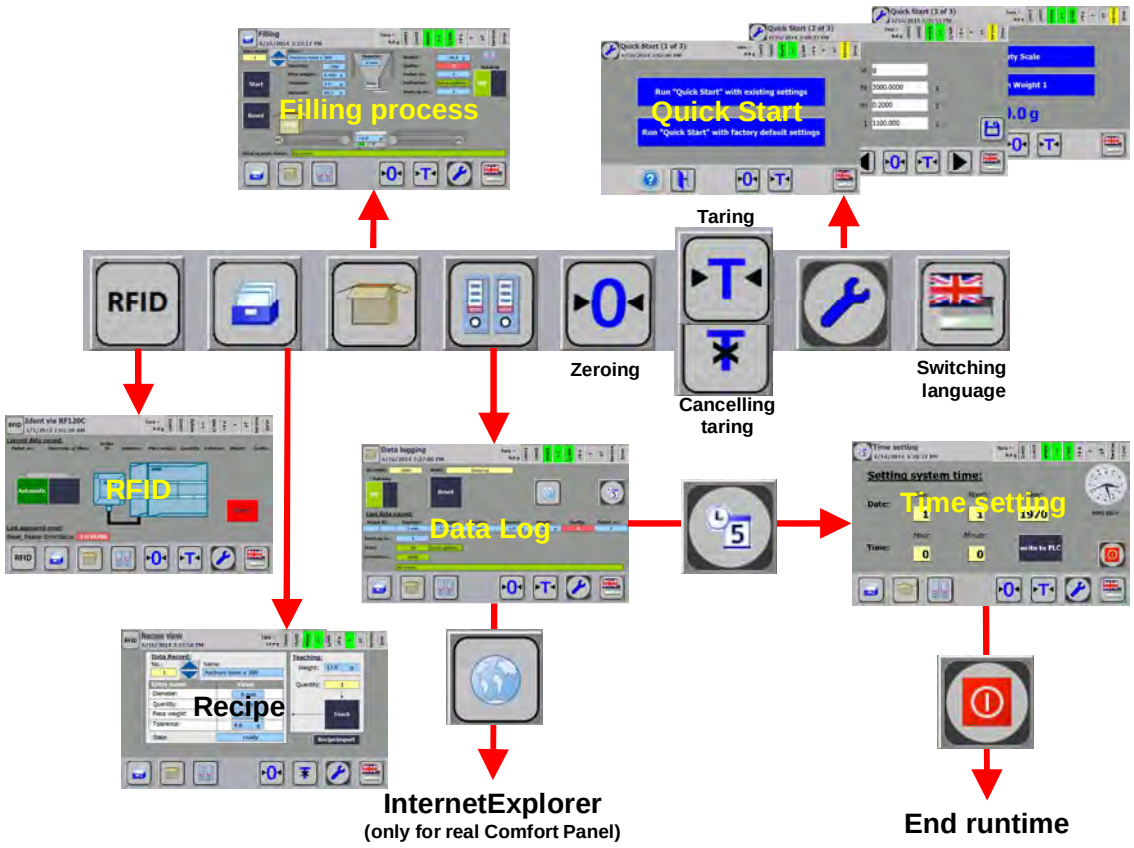
No.	Action	Comments
1.	Open the “96784939_S7-1200+RF120C_Set13_CODE_v1d1.ap13” project with the TIA Portal V13.	
2.	Select the “PLC_1” control project folder and confirm the button for loading the CPU.	
3.	Select the project folder for the “HMI_1” operator panel and click the button to load it into the Comfort Panel. Alternatively, you can simulate the TP700 Comfort operator panel also without hardware via the TIA Portal. 	

7 Operating the Application

7.1 Overview

The following picture shows the menu navigation via the toolbar.
It can be selected from any screen.

Figure 7-1



The user interface consists of 6 pictures:
In addition to the menu items from set 6:

- Filling process (start screen)
- Recipe with teach function
- Process data recording "Data Log
- Quick start for configuring the weighing module and calibrating the scale
- Time setting for synchronization between CPU and HMI
- Call of the Internet Explorer in Windows CE
  (not possible for the simulation via WinCC V13)

a screen is added to this application for monitoring the RFID functionality:

- Via 

you get to the RFID menu. Here you can look at the transponder information read and to be written.

7.2 Commissioning

To commission this application, proceed exactly as in the procedure in set 6 (\16\):

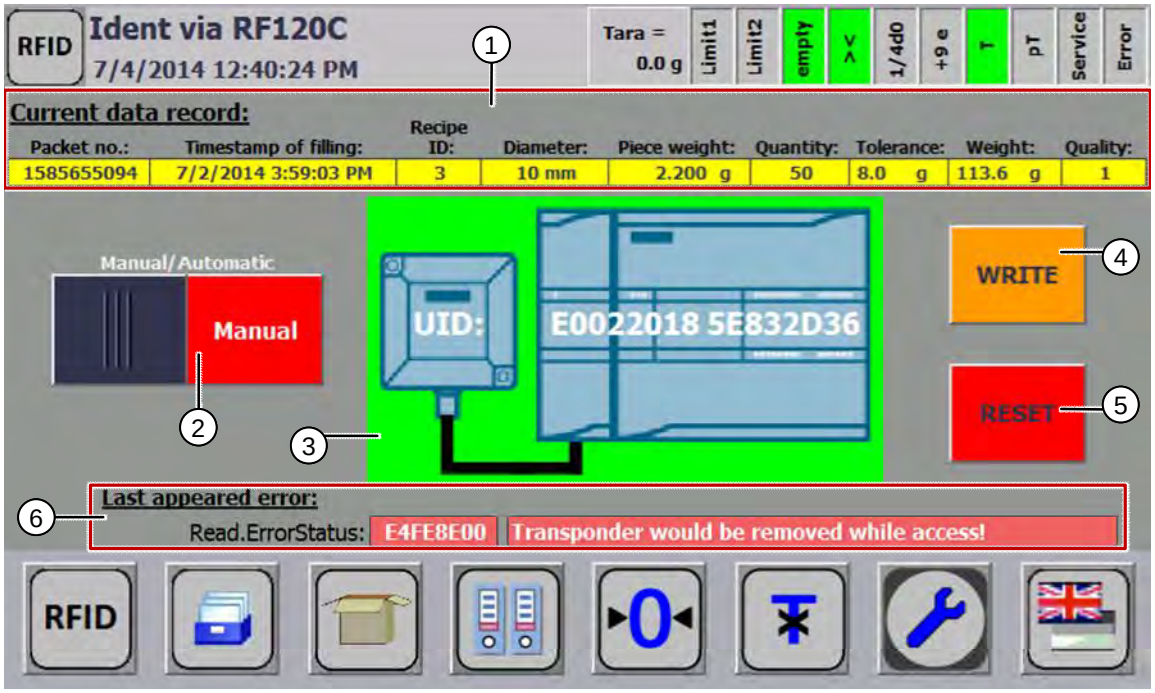
- Set the system time of the CPU.
- Configure the SIWAREX WP231 weighing module with the “quick start” menu option and do the calibration.

7.3 Live demo

7.3.1 RFID

This chapter describes the operation and visualization of the RFID expansion.

Figure 7-2



1. The current data record of the transponder user data is displayed:
   - Packet number
   - System time stamp
   - Recipe number
   - Wall anchor diameter
   - Individual weight of a wall anchor
   - Pieces
   - Tolerance
   - Filling weight
   - Quality assessment

Depending on the mode, the background color is displayed as follows:

- **Current data record:**

Packet no.:	Timestamp of filling:	Recipe ID:	Diameter:	Piece weight:	Quantity:	Tolerance:	Weight:	Quality:
1585655094	7/2/2014 3:59:03 PM	3	10 mm	2.200 g	50	8.0 g	113.6 g	1

  blue: user data read by transponder (cannot be edited)

- **Current data record:**

Packet no.:	Timestamp of filling:	Recipe ID:	Diameter:	Piece weight:	Quantity:	Tolerance:	Weight:	Quality:
1585655094	7/2/2014 3:59:03 PM	3	10 mm	2.200 g	50	8.0 g	113.6 g	1

  orange: user data to be written onto the transponder in automatic mode (cannot be edited)

- **Current data record:**

Packet no.:	Timestamp of filling:	Recipe ID:	Diameter:	Piece weight:	Quantity:	Tolerance:	Weight:	Quality:
1585655094	7/2/2014 3:59:03 PM	3	10 mm	2.200 g	50	8.0 g	113.6 g	1

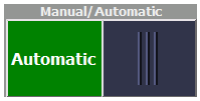
  yellow: user data to be written onto the transponder in manual mode (can be edited via the touch functionality of the input/output fields)

Note

When reading out an empty transponder, the content of the data buffer is (array of byte) 16#00 This cannot be transformed to the time stamp format DTL and output on the operator panel:

Current data record:

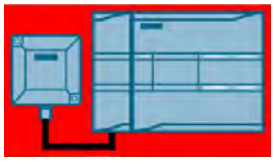
Packet no.:	Timestamp of filling:	Recipe ID:	Diameter:	Piece weight:	Quantity:	Tolerance:	Weight:	Quality:
0	##################	0	0 mm	0.000 g	0	0.0 g	0.0 g	0

2. Via the 

switch you decide
   - whether you want to edit the transponder user data yourself and trigger the write process manually via the “Write” button (function for test purposes)
   - or whether the transponder user data is generated automatically from set 6 after the successful filling process and written onto the transponder.
3. The indicator field changes the background color:
   - Green: Presence of a transponder in the detection range of the RFID reader (with display of the read out UID in hexadecimal format)

   - Orange: Feedback of successful description of the transponder with user data (with display of the previously read out UID in hexadecimal format)
     Signaling is for one second.

   - Red: Feedback of the successful reset of the RFID reader
     Signaling is for one second.



4. With the help of the 

. button you write on the transponder in manual mode with the editable user data from the field (1).
The “Write” button is only visible in manual mode (2) when a transponder is detected.

5. With the help of the 

. button you reset the RFID reader.
The “Reset” button can always be executed.

6. In the event of possibly occurring errors during the processing of function blocks
   - FB “Reset_Reader”
   - FB “Read”
   - FB “Write”

   the affected block, the hexadecimal error code with error message is displayed.

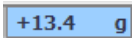
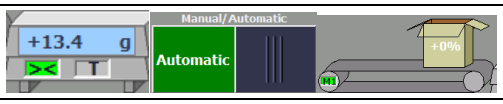
Note Further information in the event of occurring errors can be found in the “SIMATIC Ident RFID systems Communications module RF120C with application blocks for S7-1200 and S7-1500” Operating Instructions (\8\).

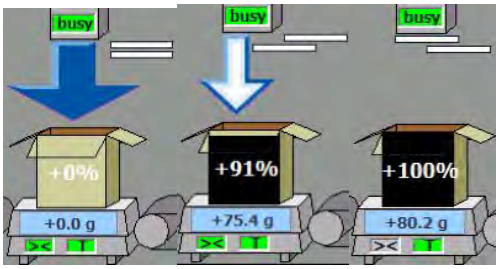
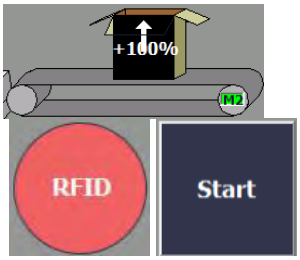
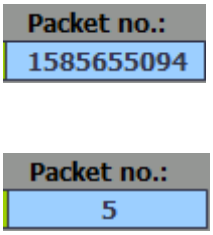
7.3.2 Transponder access error in automatic mode

To be able to write on the transponder, it has to be in the detection range of the RFID reader.
If the transponder is not detected, the filling process (removal of the produced goods) must not be interrupted.

In the following scenario, this case is introduced.

Table 7-1

No.	Action	Comments
1.	Go to the “filling process” screen.	
2.	Place a container with transponder (or without error simulation) on the load cell.	The scale will then display the weight of the container: 
3.	Select a recipe:	
4.	Click the start button.	
5.	This clears the taring, the RFID mode “Automatic” is selected and the conveyor belt “M1” (5) moves the packet (6) onto the scale.	

No.	Action	Comments
6.	Fill the container with the selected wall anchor type.	
7.	• After finishing the filling process, it is waited for the detection of the transponder for one second before the packet is removed. • If the detection is not successful, this is signaled by the flashing RFID icon. The error message is acknowledged by starting the next filling process.	
8.	Go to the “Data Log” process data logging screen.	
9.	• When the transponder is detected, the low-order DWord of the UID as packet number is written in the DataLog file. • After the lapse of the monitoring time, the count value of the filling is written as packet number in the DataLog file and the incorrect transponder access is signaled.	

8 References

Table 8-1

	Topic	Title
\1\	Siemens Industry Online Support	http://support.automation.siemens.com
\2\	Download page of the entry	http://support.automation.siemens.com/WW/view/en/96784939
\3\	S7-1200 Programmable Controller System Manual	http://support.automation.siemens.com/WW/view/en/91696622
\4\	MOBY D System Manual	http://support.automation.siemens.com/WW/view/en/13628689
\5\	SIMATIC RF Configuration Guide	http://support.automation.siemens.com/WW/view/en/67384964
\6\	Ident Profile Library for the TIA Portal	http://support.automation.siemens.com/WW/view/en/90063944
\7\	SIMATIC Ident RFID systems SIMATIC RF200 System Manual	http://support.automation.siemens.com/WW/view/en/47189592
\8\	SIMATIC Ident RFID systems Communications module RF120C Operating Instructions	http://support.automation.siemens.com/WW/view/en/77485950
\9\	Delivery Release for SIMATIC STEP 7 Professional / Basic V13	http://support.automation.siemens.com/WW/view/en/84047138
\10\	SIMATIC WinCC V13 Released for Delivery	http://support.automation.siemens.com/WW/view/en/88360672
\11\	Updates for STEP 7 V13 and WinCC V13	http://support.automation.siemens.com/WW/view/en/90466591
\12\	Delivery Release for RF120C Communications Module for SIMATIC S7-1200	http://support.automation.siemens.com/WW/view/en/78961671
\13\	STEP 7 Basic V13.0 System Manual	http://support.automation.siemens.com/WW/view/en/89336297
\14\	WinCC Advanced V13.0 System Manual	http://support.automation.siemens.com/WW/view/en/91479053
\15\	SIMATIC HMI HMI Devices Comfort Panels	http://support.automation.siemens.com/WW/view/en/49313233
\16\	Quality Assurance by means of Weighing, Control and Logging with the SIMATIC S7-1200 (Set 6)	http://support.automation.siemens.com/WW/view/en/82454336

9 History

Table 9-1

Version	Date	Modifications
V1.1	09/2014	First version