Fieldbus Card

Profibus, ProfiNet, EtherCat, DeviceNet, CANopen, Ethernet/IP

Technical Manual

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1.0 Introduction

The Fieldbus Card is used to allow an SCT to become one of several options as listed below.

1.1 Technical Data

- Power supply: 12 to 24 V
- Maximum current draw: 250 mA (with 12 V power supply)
- HUB configuration: check up to 16 weighing scales simultaneously
- RS-485 communication: opto isolated against electric or electrostatic discharges
- Addressing:
  - CANopen: up to 127 different addresses (1 to 127)
  - EtherCAT: automatic addressing (not settable)
  - PROFINET: uses addressing through IPv4
  - DeviceNet: up to 64 different addresses (from 0 to 63 through MAC address)
  - PROFIBUS: up to 99 different addresses (from 0 to 98)
- Baud rate:
  - CANopen: 10 Kbit/s to 1 Mbit/s
  - EtherCAT: 9600 bit/s to 115200 bit/s
  - PROFINET: depends on the network speed (up to 100 Mbit/s)
  - DeviceNet: 9600 bit/s to 115200 bit/s
  - PROFIBUS: 9600 bit/s to 12 Mbit/s

2.0 Setup

Each SCT is provided with two parallel RS-485 ports with RJ45 connectors. The ports are used to connect the SCT with the corresponding port on the fieldbus module. SCTs can be connected in line (up to 16 weighing scales) by connecting each SCT to the next one and the first SCT to the fieldbus module. After modification of the setup parameters, this creates a network that can be managed by one or more PCs.

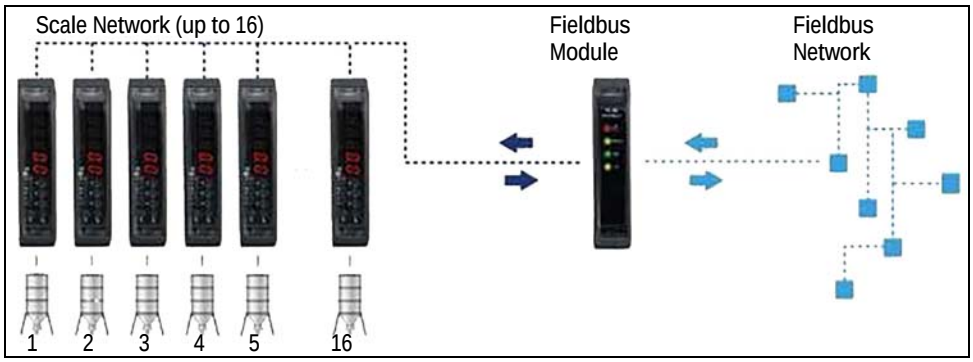

Figure 2-1. Connection

The converters method of connection to PC:

- EtherCat – RJ45
- CANopen – 3 wires
- DeviceNet – 5 wires (2 if there is a power supply)
- PROFIBUS – DB9 female connector
- PROFINET – RJ45

2.1 Profibus Serial Communication Mode

To select the Profibus communication protocol, enter *SET-UP ENVIRONMENT*.

1. Press ZERO or TARE during the countdown. tYPE displays.
2. Press ZERO or TARE to display SEtUP.
3. Press PRINT.
4. Press ZERO or TARE to display SEr iAL
5. Press PRINT.
6. Press ZERO or TARE to display Pc. SEL.
7. Press PRINT to enter the selection menu of the PC port.
8. Press ZERO or TARE to display 485.
9. Press PRINT.
10. Press ZERO or TARE to display CoM. PC.
11. Press PRINT to enter the setup menu of the Communication Parameters in the PC port. PCModE displays.
12. Press PRINT to enter.

13. Press ZERO or TARE to display PrOF ib.
14. Press PRINT to confirm. Pro. Add (Instrument serial address) displays momentarily.
15. Type the serial address of the instrument and press PRINT. CONPAt displays.
16. Select yes or no to indicate which GSD file will be used (download from www.RiceLake.com)
    - YES – enables the compatibility of the Profibus module communication with the *GSD.V.1* file.
    - NO – leaves the compatibility of the Profibus module communication with the *GSD.V.2* file.
17. Press C repeatedly until SAvEP displays.
18. Press PRINT to confirm changes or any other key to not save.
19. Cycle power, the display should read P. bUS. In followed by P. bUS. 0H and the version of the GSD file being used.

2.2 SCT-2200

Navigate to *SETUP/SERIAL/COM PC/ PC MODE/FLD.BUS/ BUS.TYP:*

1. Select the type of bus:
   - Profibus (PrOF ib)
   - Ethernet/IP (Eth. IP)
   - Profinet (PrOF in)
   - Ethercat (Eth. CAt)
   - CANOpen (CAnoPn)
   - DeviceNet (dEv. nEt)

   Once the type of bus is selected, enter the appropriate parameters:
   - Profibus:
     node ID (Node.Id)
   - Ethernet/IP, Profinet:
     AUt. cFG: Auto IP configuration (no/yes)
     IP. : IP address
     nEt. MSK: Subnet mask
     GAt. WAY: Gateway
   - CANopen:
     nod. Add (1-127): node address
     bAUd. r: baud-rate, valori: 1 MB, 800 kB, 500 kB, 250 kB, 125 kB, 100 kB, 50 kB, 20 kB, 10 kB
   - DeviceNet:
     MAc. id (0-63): MAC ID
     bAUd. r: baud-rate, valori: 500kB, 250kB, 125kB
2. Set number of the scales (nUM. SCA) for the 485 sub-network managed by the hub device (1 to 16).
3. Set SCA. Add (visible if nUM. SCA is greater than 1): 485 address of the scale, if nUM. SCA is equal to 1 the 485 address is set equal to 1.

2.3 Serial Communication Parameters

For protocols other than Profibus or to set more of a balance, set the baud rate to 115200 for the best performance.

2.4 Input and Output Data Areas

There are two data areas, an input and an output, the input area is read by this device and the output is written. All the numeric values have the Big Endian format (the 1st byte is the most significant one).

2.4.1 Input Data Area

The input data area is read by the module (the instrument) and is made up of 16 registers, each of 2 bytes (32 bytes overall).

SCT-1100 Only			
N° Reg	Input Registers	Bit	N° bytes
0	Channel 1 Status Register	MSB	0
	Channel 1 Status Register	LSB	1
1	Channel 2 Status Register	MSB	2
	Channel 2 Status Register	LSB	3
2	Channel 3 Status Register	MSB	4
	Channel 3 Status Register	LSB	5
3	Channel 4 Status Register	MSB	6
	Channel 4 Status Register	LSB	7
4	Input Status Register	MSB	8
	Input Status Register	LSB	9
5	Command Status Register	MSB	10
	Command Status Register	LSB	11
6	Output Status Register	MSB	12
	Output Status Register	LSB	13
7	N°last page read or written	MSB	14
	N°last page read or written	LSB	15
8	1st set-up page word		16
			17
.....			
15	8th set-up page word		30
			31

Table 2-1. Input Data Area if tYPE >> ind. Ch or dEP. Ch and SCT (SCT-1100 Only)

SCT-1100 and SCT-2200			
N° Reg	Input Registers	Bit	N° bytes
0	Gross Weight Value	3	0
	Gross Weight Value	2	1
1	Gross Weight Value	1	2
	Gross Weight Value	0	3
2	Net Weight Value	3	4
	Net Weight Value	2	5
3	Net Weight Value	1	6
	Net Weight Value	0	7
4	Input Status Register	MSB	8
	Input Status Register	LSB	9
5	Command Status Register	MSB	10
	Command Status Register	LSB	11
6	Output Status Register	MSB	12
	Output Status Register	LSB	13
7	N°last page read or written	MSB	14
	N°last page read or written	LSB	15
8	1st set-up page word		16
			17
.....			
15	8th set-up page word		30
			31

Table 2-2. Input Data Area if tYPE >> trAnSM (SCT-1100 Only)

GROSS WEIGHT and NET WEIGHT value format (0-3 registers) whole numbers value (no decimals)

Example:
if 3 decimals are set, the 3,000 value is read 3000
if 2 decimals are set, the 3,00 value is read 300

2.4.2 Channel Status Register

Bit	Description	Bit Meaning	
LSB		0	1
0	Weight Polarity	+	--
1	Weight Stability	NO	YES
2	Under load Condition	NO	YES
3	Overload Condition	NO	YES
4	Gross weight zone	Out of Zone 0	In Zone 0
5-7	Not used		
MSB			
8-15	Not used		

Table 2-3. Channel Status Register

Bit	Description	Bit Meaning	
LSB		0	1
0	Net Weight Polarity	+	--
1	Gross Weight Polarity	+	--
2	Weight Stability	NO	YES
3	Underload Condition	NO	YES
4	Overload Condition	NO	YES
5	Entered Tare Condition	NO	YES
6	Manual Tare Condition	NO	YES
7	Gross ZERO zone	Out of Zone 0	In Zone 0
MSB			
8	Input 1	Disabled	Enabled
9	Input 2	Disabled	Enabled
10-13	Not used		
14	Displayed Channel (low bit)*		
15	Displayed Channel (high bit) (from 0 to 3)*		
*High bit, Low Bit: 0 0 → Channel 1 0 1 → Channel 2 1 0 → Channel 3 1 1 → Channel 4			

Table 2-4. Input Status Register (if TYPE >> Ind. Ch or dEP. Ch)

Bit	Description	Bit Meaning	
LSB		0	1
0-7	Not used		
MSB			
8	Input 1	Disabled	Enabled
9	Input 2	Disabled	Enabled
10-13	Not used		
14	Displayed Channel (low bit)*		
15	Displayed Channel (high bit) (from 0 to 3)*		
*High bit, Low Bit: 0 0 → Channel 1 0 1 → Channel 2 1 0 → Channel 3 1 1 → Channel 4			

Table 2-5. Input Status Register (IF TYPE >> ErRnSM)

2.4.3 Output Status Register

It is input register number 6; two bytes defined in Table 2-6:

Bit	Description	Bit Meaning	
LSB		0	1
0	RELE' 1	Not Excited	Excited
1	RELE' 2	Not Excited	Excited
2	RELE' 3	Not Excited	Excited
3	RELE' 4	Not Excited	Excited
4	RELE' 5	Not Excited	Excited
5	RELE' 6	Not Excited	Excited
6-7	Not used		
MSB			
8-15	Not used		

Table 2-6. Output Status Register

2.4.4 Command Status

It is input register number 5; two bytes defined in the following way:

High Byte → *Last command received*

Low Byte:

low nibble → ***Counting of processed commands*** (module 16)

high nibble → ***Result of last command received***

In which *Result of last command received* can take on the following values:

OK = 0 – Correct command and carried out

ExceptionCommandWrong = 1 – Wrong command

ExceptionCommandData = 2 – Wrong data in the command

ExceptionCommandNotAllowed = 3 – Not allowed command

ExceptionNoCommand = 4 – Inexistent command

2.5 Output Data

The output data area is written by the master (is therefore read by the instrument) and is made up of 16 registers, each of 2 bytes (32 bytes overall).

Reg No.	Output Registers	Bit	N° bytes
0	Command Register	MSB	0
	Command Register	LSB	1
1	Parameter 1	3	2
	Parameter 1	2	3
2	Parameter 1	1	4
	Parameter 1	0	5
3	Parameter 2	3	6
	Parameter 2	2	7
4	Parameter 2	1	8
	Parameter 2	0	9
5	*Not used*		10
	Not used		11
6	*Not used*		12
	Not used		13
7	*Not used*		14
	Not used		15
8	1st set-up page word		16
			17
.....			
15	8th set-up page word		30
			31

Table 2-7. Output Data

2.5.1 Command Register

It is the output register number 0. It is made up of two bytes and can take on the following values, which correspond to the implemented commands described in the table.

Execution of a Command

The execution of a command is made when the contents of the Command Register varies (therefore in order to repeat the last command, first set the Command Register to the *NO COMMAND* value and then to the *COMMAND* value).

The only exceptions are the *READ_SETUP, WRITE_SETUP* and *CHANGE_PAGE* commands, which are executed even upon just the varying of Parameter 1 (page no. to be read/written). Therefore:

To read various setup pages, set the *READ_SETUP* command with the first page that is intended to write in Param 1, then change each time Param 1 with the new page no. to be read.

To write various pages, set the *WRITE_SETUP* command with the no. of the first page to be written in Param 1 and the data in registers 8-15 of the output area; then each time one varies the data of the registers 8-15 and the page no. in Param 1.

Implemented Command	Command Register Value	Description
NO_COMMAND	0 (0000 Hex)	No command
ZERO_REQUEST	1 (0001 Hex)	Zero scale execution (*)
TARE_REQUEST	2 (0002 Hex)	Automatic tare execution (*)
TAREMAN_REQUEST	3 (0003 Hex)	Manual tare execution (*) (the value will be entered in Parameter 1 (2))
NET_SWITCH_REQUEST	4 (0004 Hex)	Display switch on the net weight * **
GROSS_SWITCH_REQUEST	5 (0005 Hex)	Display switch on the gross weight * **
CHANNEL_1_REQUEST	6 (0006 Hex)	Switching on Channel 1
CHANNEL_2_REQUEST	7 (0007 Hex)	Switching on Channel 2
CHANNEL_3_REQUEST	8 (0008 Hex)	Switching on Channel 3
CHANNEL_4_REQUEST	9 (0009 Hex)	Switching on Channel 4
WRITE_SETPOINT_1	10 (000A Hex)	Setpoint 1 (valore ON in Param. 1; valore OFF in Param. 2) See Section 2.5.2
WRITE_SETPOINT_2	11 (000B Hex)	Setpoint 2 writing (ON value in Param. 1; OFF value in Param. 2) See Section 2.5.2
WRITE_SETPOINT_3	12 (000A Hex)	Setpoint 3 writing (ON value in Param. 1; OFF value in Param. 2) See Section 2.5.2
WRITE_SETPOINT_4	13 (000B Hex)	Setpoint 4 writing (ON value in Param. 1; OFF value in Param. 2) See Section 2.5.2
WRITE_SETPOINT_5	14 (000A Hex)	Setpoint 5 writing (ON value in Param. 1; OFF value in Param. 2) See Section 2.5.2
WRITE_SETPOINT_6	15 (000B Hex)	Setpoint 6 writing (ON value in Param. 1; OFF value in Param. 2) See Section 2.5.2
SET_OUTPUT	25 (0019 Hex)	Setting the RELAY (4)
READ_SETUP	26 (001A Hex)	Setup page reading
WRITE_SETUP	27 (001B Hex)	Setup page writing
WRITE_FLASH	28 (001C Hex)	Saving the set-up in flash
CHANGE_PAGE	29 (001D Hex)	Alibi page (5) or transm page (7) or counting(9)
READ_ALIBI	30 (001E Hex)	Weigh reading on alibi (6)
WRITE_ALIBI	31 (001F Hex)	Storage of weigh on alibi (5)
HOLD_PEAK_WEIGHT	32 (0020 Hex)	Block the weight on the display
UNLOCK_WEIGHT	33 (0021 Hex)	After second *Peak Hold Weight* allows to unlock the weight on the display and to see the effective weight
RESTART_INSTRUMENT	34 (0022 Hex)	Restart the instrument
READ_CALIBRATION	35 (0023 Hex)	Read data of calibration
WRITE_CALIBRATION	36 (0024 hex)	Write data of calibration
POINT_ACQUISITION	37 (0025 hex)	Acquisition calibration point
ABORT_CALIBRATION	38 (0026 Hex)	Cancellation procedure calibration
KEYBOARD_ENABLE	40 (0028 Hex)	Block keyboard (parameter 1 = 0) o unlock keyboard (parameter 1 = 1)
NUMBER_OF_PIECES	41 (0029 Hex)	Write number of pieces with parameter 1 that correspond with the number of pieces
APW_INPUT	42 (002° Hex)	Input during the state of insertion in APW from keyboard
APW_SET	43 (002B Hex)	Set the average piece weight; and the value is in parameter 1
SET_ZERO_TIMEOUT	44 (002C Hex)	Set the max time of execution of the zero function (parameter 1 = new value in seconds, max number of seconds is 127)
* This command is not managed in the trANSM mode.		
** Active functions only in NTGS mode (net / gross switch)		

Table 2-8. Command Register

2.5.2 Value format of Parameter 1 and Parameter 2:

→ *For the MANUAL TARE (only Param1):*

→ *For SETPOINTS 1 and 2:*

Whole numbers (no decimals)

Example:
If 3 decimals are set, in order to enter the value 3,000 → one should write 3000
If 2 decimals are set, in order to enter the value 3,00 → one should write 300

2.5.3 Setting of the Relays

The status of the relays is settable using Parameter 1:

Parameter 1:

bit 0 → RELAY 1 in which bit 0 = 1 → RELAY 1 CLOSED; bit 0 = 0 → RELAY 1 OPEN

bit 1 → RELAY 2 in which bit 1 = 1 → RELAY 2 CLOSED; bit 1 = 0 → RELAY 2 OPEN

Value format of Parameter 1 and Parameter 2 for the RELAYS:

→ Bit configuration

In the case a relay is linked to a setpoint, the command, relative to that relay, is ignored.

The writing of the setpoint values does not cause the automatic flash saving, but are set temporarily. In order to save these in flash one should execute the *WRITE_FLASH* command.

2.5.4 Alibi Page

To go to the ALIBI page and set the value 1000 in Parameter 1.

With the writing command, fill the page with the values described in Table 2-9, then transmit the writing command.

Format of the Parameter 1 value:

Whole numbers (no decimals)

Input Data Area (N° Byte)	Description	Byte
16	Stored gross weight value (byte 3)	3
17	Stored gross weight value (byte 2)	2
18	Stored gross weight value (byte 1)	1
19	Stored gross weight value (byte 0)	0
20	Stored tare weight value (byte 3)	3
21	Stored tare weight value (byte 2)	2
22	Stored tare weight value (byte 1)	1
23	Stored tare weight value (byte 0)	0
24	ID: Weigh number	3
25	ID: Weigh number	2
26	ID: Weigh number	1
27	ID: Weigh number	0
28	Alibi status register	MSB
29	Alibi status register	LSB
30-31	Not used	

Table 2-9. Alibi Page (16 bytes)

Format Alibi Status Register Value

2 bytes defined in the following way:

Bit	Description
7-10	Number of rewritings (0 to 255)
10-8	Number of scale (1 to 4)
11	Type of tare; bit 11 = 1 manual tare; bit 1 = 0 null or semiautomatic tare
12-15	Not Used

Table 2-10. Alibi status register value

2.5.5 Weigh Reading on Alibi

To read a weight stored in the Alibi, set the rewriting number in Parameter 1 and the weight number (ID) in Parameter 2. The command automatically executes the change on the Alibi page.

Format of the Parameter 1 and Parameter 2 values with whole numbers (no decimals)

2.5.6 Transm Page (only if tYPE >> trAnSM)

To go to the Transm page, set a value 2000 in Parameter 1. With the writing command, fill the page with the values in Table 2-11, then transmit the writing command. After the start-up of the indicator, the value 2000 is set automatically as the last page read.

Format of the Parameter 1 value with whole numbers (no decimals)

Input Data Area (N° Byte)	Description			Byte	Description	Byte
Date	2000	Net 2001	Tare 2002	--	Net/Tare 2003	--
16	Channel 1 weight value	Ch 1 net weight	Ch 1 tare weight	3	Ch 1 net weight	1
17	Channel 1 weight value	Ch 1 net weight	Ch 1 tare weight	2	Ch 1 net weight	0
18	Channel 1 weight value	Ch 1 net weight	Ch 1 tare weight	1	Ch 1 tare weight	1
19	Channel 1 weight value	Ch 1 net weight	Ch 1 tare weight	0	Ch 1 tare weight	0
20	Channel 2 weight value	Ch 2 net weight	Ch 2 tare weight	3	Ch 2 net weight	1
21	Channel 2 weight value	Ch 2 net weight	Ch 2 tare weight	2	Ch 2 net weight	0
22	Channel 2 weight value	Ch 2 net weight	Ch 2 tare weight	1	Ch 2 tare weight	1
23	Channel 2 weight value	Ch 2 net weight	Ch 2 tare weight	0	Ch 2 tare weight	0
24	Channel 3 weight value	Ch 3 net weight	Ch 3 tare weight	3	Ch 3 net weight	1
25	Channel 3 weight value	Ch 3 net weight	Ch 3 tare weight	2	Ch 3 net weight	0
26	Channel 3 weight value	Ch 3 net weight	Ch 3 tare weight	1	Ch 3 tare weight	1
27	Channel 3 weight value	Ch 3 net weight	Ch 3 tare weight	0	Ch 3 tare weight	0
28	Channel 4 weight value	Ch 4 net weight	Ch 4 tare weight	3	Ch 4 net weight	1
29	Channel 4 weight value	Ch 4 net weight	Ch 4 tare weight	2	Ch 4 net weight	0
30	Channel 4 weight value	Ch 4 net weight	Ch 4 tare weight	1	Ch 4 tare weight	1
31	Channel 4 weight value	Ch 4 net weight	Ch 4 tare weight	0	Ch 4 tare weight	0

Table 2-11. Transm Page (16 bytes)

Commands Performed in the Mode Transm

Modbus/Profibus Zero command (1) in Transm mode: parameter 1 is to be set to a non-zero value to indicate the scale channel that is to be zeroed.

Modbus/Profibus Tare command (2) in Transm mode: parameter 1 is to be set to a non-zero value to indicate the scale channel that is to be tared.

Modbus/Profibus Preset tare command (3) in Transm mode: parameter 2 is to be set to a non-zero value to indicate the scale channel that is to be tared.

2.5.7 Counter Mode

Only for SCT-2200 in counter mode with values :

Input Data Area (N° Byte)	Description	Byte
16	APW decimals (byte 1)	3
17	APW decimals (byte 0)	2
18	APW unit (byte 1)	1
19	APW unit (byte 0)	0
20	PCS value (byte 3)	3
21	PCS value (byte 2)	2
22	PCS value (byte 1)	1
23	PCS value (byte 0)	0
24	APW value (byte 3)	3
25	APW value (byte 2)	2
26	APW value (byte 1)	1
27	APW value (byte 0)	0
28-30		

Table 2-12. Counter Mode (16 bytes) Page 6000

The command regarding the counting is : 41 (0x0029) - 42 (0x002A) - 43 (0x002B)

2.6 Setup Area

The setup area is the one stored in flash (1024 bytes) and is made up of 64 pages (from 0 to 63). For an approved instrument, it's not possible to write the metric parameters which are between page 0 and the first half of page 38. It is possible to write only the data between the second half of page 38 and page 63. By writing one of the pages between 0 and 37 when the instrument is approved, the result of the command is *ExceptionCommandNotAllowed*, by writing in the other one, the result is *CommandOk*. In any case page 38 is not copied completely, only the second half.

Area Setup – Pages 5, 6, 14 and 15

Input/Output Data Area (Byte No)	Description			
--	Page 5	Page 6	Page 14	Page 15
16		*Not Used*	Range 1 Channel 2 (LSB)	*Not Used*
17		Range 1 Channel 1 Division (LSB)	Range 1 Channel 2	*Not Used*
18		Range 1 Channel 1 Division (MSB)	Range 1 Channel 2	Channel 2 decimals
19		Range 2 Channel 1 Division (LSB)	Range 1 Channel 2 (MSB)	Unit of Measure Channel 2 *
20		Range 2 Channel 1 Division (MSB)	Range 2 Channel 2 (LSB)	
21	Range 1 Channel 1 (LSB)	*Not Used*	Range 2 Channel 2	
22	Range 1 Channel 1	*Not Used*	Range 2 Channel 2	
23	Range 1 Channel 1	Channel 1 Decimals	Range 2 Channel 2 (MSB)	
24	Range 1 Channel 1 (MSB)	Channel 1 Unit of Measure *	*Not Used*	
25	Range 2 Channel 1 (LSB)		*Not Used*	
26	Range 2 Channel 1		*Not Used*	
27	Range 2 Channel 1		*Not Used*	
28	Range 2 Channel 1 (MSB)		Range 1 Channel 2 Division (LSB)	
29	*Not Used*		Range 1 Channel 2 Division (MSB)	
30	*Not Used*		Range 2 Channel 2 Division (LSB)	
31	*Not Used*		Range 2 Channel 2 Division (MSB)	

Table 2-13. Area Setup (16 bytes) Pages 5, 6, 15, 16

* Meaning of the numeric value in the Unit of Measure field.

0 → Grams; 1 → Kilograms; 2 → Tons; 3 → Pounds

Area Setup – Pages 22, 23, 31 and 32

Input/Output Data Area (Byte No)	Description			
--	Page 22	Page 23	Page 31	Page 32
16		Range 2 Channel 3		*Not used*
17		Range 2 Channel 3		*Not used*
18		Range 2 Channel 3 (MSB)		Range 1 channel 4 Division (LSB)
19		*Not Used*		Range 1 channel 4 Division (MSB)
20		*Not Used*		Range 2 channel 4 Division (LSB)
21		*Not Used*		Range 2 channel 4 Division (MSB)
22		*Not Used*	Range 1 Channel 4 (LSB)	*Not used*
23		Range 1 Channel 3 Division (LSB)	Range 1 Channel 4	*Not used*
24		Range 1 Channel 3 Division (MSB)	Range 1 Channel 4	Channel 4 decimals
25		Range 2 Channel 3 Division (LSB)	Range 1 Channel 4 (MSB)	Channel 4 unit of measure *
26		Range 2 Channel 3 Division (MSB)	Range 2 Channel 4 (LSB)	
27	Range 1 Channel 3 (LSB)	*Not Used*	Range 2 Channel 4	
28	Range 1 Channel 3	*Not Used*	Range 2 Channel 4	
29	Range 1 Channel 3	Channel 3 decimals	Range 2 Channel 4 (MSB)	
30	Range 1 Channel 3 (MSB)	Channel 3 unit of measure *	*Not Used*	
31	Range 2 Channel 3 (LSB)		*Not Used*	

Table 2-14. Area Setup (16 bytes) pages 22, 23, 31, 32

* Meaning of the numeric value in the Unit of Measure field.

0 → Grams; 1 → Kilograms; 2 → Tons; 3 → Pounds

2.7 Calibration Sequence

The following tables contain metrological data, that is possible to read/write.

Input Data Area (N° Byte)	Description	Byte
16	Unit Of Measure	1
17	Unit Of Measure	0
18	1st Range Division	1
19	1st Range Division	0
20	2nd Range Division	1
21	2nd Range Division	0
22	Decimal	1
23	Decimal	0
24	1st Range Capacity	3
25	1st Range Capacity	2
26	1st Range Capacity	1
27	1st Range Capacity	0
28	2nd Range Capacity	
29	2nd Range Capacity	
30	2nd Range Capacity	
31	2nd range capacity	

Table 2-15. Metrological Data, Page 5000 (16 byte)

Unit of measure

0 → g; 1 → kg; 2 → T; 3 → L

Input Data Area (N° Byte)	Description	Byte
16	Calibration Point	1
17	Calibration Point	0
18	1st Calibration Weight (MSB)	
19	1st Calibration Weight	
20	1st Calibration Weight	
21	1st Calibration Weight (LSB)	
22	2nd Calibration Weight (MSB)	
23	2nd Calibration Weight	
24	2nd Calibration Weight	
25	2nd Calibration Weight (LSB)	
26	3rd Calibration Weight (MSB)	
27	3rd Calibration Weight	
28	3rd Calibration Weight	
29	3rd Calibration Weight (LSB)	
30	Calibration Status	1
31	Calibration Status	0

Table 2-16. Page Content Weight Of Calibration, Page 5001 (16 byte)

Value	Denomination	Description
0	CALIBRATION_NOT_STARTED	Calibration not is in execution
1	CALIBRATION_ACQUISTION_UNDERWAY	Acquisition point calibration in progress
2	CALIBRATION_ACQUISTION_OK	Point calibration successfully acquired
3	CALIBRATION_ACQUISTION_ERROR	Error acquisition point calibration
4	CALIBRATION_OK	Calibration OK
5	CALIBRATION_ERROR	Error in Calibration

Table 2-17. State of Calibration

Input Data Area (N° Byte)	Description
16	Zero calibration ADC value (MSB)
17	Zero calibration ADC value
18	Zero calibration ADC value
19	Zero calibration ADC value (LSB)
20	1st calibration point ADC value (MSB)
21	1st calibration point ADC value
22	1st calibration point ADC value
23	1st calibration point ADC value (LSB)
24	2nd calibration point ADC value (MSB)
25	2nd calibration point ADC value
26	2nd calibration point ADC value
27	2nd calibration point ADC value (LSB)
28	3rd calibration point ADC value (MSB)
29	3rd calibration point ADC value
30	3rd calibration point ADC value
31	3rd calibration point ADC value (LSB)

Table 2-18. Calibration Point, Page 5002 (16 byte)

Number	Command	Note
35 (0023 Hex)	READ_CALIBRATION	Copy of calibration data of the channel equal to parameter 1 into temporary area (accessible via the pages 5000 to 5002)
36 (0024 Hex)	WRITE_CALIBRATION	Parameter 1 = 0 store of temporary data into calibration data (non-volatile memory) Parameter 1 = 5000 copy data output area values (byres 16 to 31)Into the temporary calibration area related to metrologic values Parameter 1 = 5001 copy data output area values (byres 16 to 31)Into the temporary calibration area related to calibration weights values Parameter 1 = 5002 copy data output area values (bytes 16 to 31) into the temporary calibration area related to calibration ADC values
37 (0025 Hex)	POINT_ACQUISITION	Parameter 1 is the point to acquire
38 (0026 Hex)	ABORT_CALIBRATION	Abort the calibration under way

Table 2-19. Calibration Commands

2.7.1 Calibration Sequence

1. Set parameter 1 to the channel to calibrate. If type is equal to dependent channels, parameter 1 can only be equal to zero.
2. Select *READ_CALIBRATION*.
3. Insert the metrologic value on Page 5000.
4. Select *WRITE_CALIBRATION*. Parameter 1 can be equal to 5000, if necessary.
5. Set up calibration point on Page 5001, byte 16-17.
6. Set up the value of weight(s) of calibration on page 5001, if values the weights gave calibration there Page 5001, from bytes 18-29.
7. Set parameter 1 to 5001 and select *WRITE_CALIBRATION*.
8. If doing a theoretical calibration, insert the values ADC directly on Page 5002.
9. Set parameter 1 to 5002 and select *WRITE_CALIBRATION*
   or
   set page 5001 to read the log calibration status (byte 30-31). Unload the platform. Set parameter 1 to 0 and select *POINT_ACQUISITION*. *CALIBRATION_ACQUISTION_OK displays.*

   If *CALIBRATION_ACQUISTION_ERROR* displays, repeat Step 9.
10. Load the platform with the first calibration weight.
11. Select *POINT_ACQUISITION* with parameter equal to 1. *CALIBRATION_ACQUISTION_OK displays.*

    If *CALIBRATION_ACQUISTION_ERROR* displays, repeat Step 10.
12. Repeat Step 10 -to- date calibration points (if any).
13. Select *WRITE_CALIBRATION* with parameter 1 equal to zero to store calibration. *CALIBRATION_OK* displays.

    If *CALIBRATION_ERROR* displays, repeat from Step 1.

2.8 Setting Operating Mode

Read and set the operating mode between independent channels, channels and employees transm remotely.

Define the operating mode in bytes 16-17, define the number of channels being used in bytes 18 to 19.

Input Data Area (N° Byte)	Description
16	Operating mode (MSB)
17	Operating mode (LSB)
18	Number of channels (MSB)
19	Number of channels (LSB)
20-31	

Table 2-20. Calibration Point, Page 5003 (16 byte)

Value	Mode
0	Independent channels
1	Dependent channels
2	Transm

Table 2-21. Operating Modes

2.9 Hub Mode

This mode can be is used with the tools associated with one of following modules

- PROFIBUS1S
- PROFINET1S
- ETHERCAT1S
- DEVICENET1S
- CANOPEN1S

485 Network

Step setup	Value
SETUP → SEri AL → PC SEL	485
SETUP → SEri AL → COn. PC → PCnOdE	Pb. nULt
SETUP → SEri AL → COn. PC → PCnOdE → Pr0. Add	Profibus ID of the module
SETUP → SEri AL → COn. PC → PCnOdE → SCA. Add	485 address of SCT (from 1 with consecutive values)
SETUP → SEri AL → COn. PC → PCnOdE → nUn. SCA	Number of SCTs of the 485 network
SETUP → SEri AL → COn. PC → bAUd	1 15200

Table 2-22. SCTs (only Profibus)

Step setup	Value
SEtUP → SEr1 AL → PC SEL	485
SEtUP → SEr1 AL → CON. PC → PCNOdE	FLd. BUS
→ bUS. tYP	ProF ib : Profibus Eth. IP : Ethernet/IP ProF in : Profinet Eth. CAt : Ethercat CANoPn : CANopen dEu. nEt : DeviceNet
Other parameters depending on the protocol selected	
SEtUP → SEr1 AL → CON. PC → PCNOdE → NUM.SCA	Balance number on the 485 network
SEtUP → SEr1 AL → CON. PC → PCNOdE → SCA. AdD	Address 485 of the SCT (from 1 consecutive value)
SEtUP → SEr1 AL → CON. PC → bAUD	115200

Table 2-23. SCT's

Parameters dependent from selected protocol: read paragraph 1.2

Profinet – the name of the node to be used in Profinet project associated with the master node of the network is given by Dini-<IP4>, where IP4 is the last byte of the IP address entered in the configuration of SCT, even if the self-configuration of the IP address is used.

Example: IP = 192.168.1.10, the node name is Dini-010.

Verify 485 network

1. From the configuration menu select dI AG→**5. SCAn.** The scale will execute a continuous cycle to check if the scales on the network work.
   - Value 1 means that the selected scale is on-line.
   - Value 0 means that the selected scale is off-line.
2. Using arrow keys the instrument enters in the manual scan.
3. Press C key to exit. At connection 485 network displays briefly, followed by Pb. COnn. When the Profibus master connects the yellow led of the module will turn on.

2.10 Output Data

The area of Profibus output is composed of 32 bytes as indicated in Table 2-24.

Byte	Data
1	Scale Command register (MSB) → to which scale send the command (7F Broadcast)
2	Scale Command register (LSB) → command
3	Data
…	…
32	Data

Table 2-24. Output Data Area

The Command Register structure:

- MSB: to which scale of the 485 network send the data of the area (1 → scale 1, 2 → scale 2, …)
- LSB: command, ignored by hub module.

The module will send to the selected scale the whole area as received by the Profibus master, but with the MSB byte of the Command Register equal to zero.

Commands with MSB greater than 0x6F will be managed by the hub module.

Command (Hex)	Description
F000	Fill in the Input Data Area with scale data system (Table 2-38 on page 19)
F001	Fill in the Input Data Area with the data received from the scale 1
F002	Fill in the Input Data Area with the data received from the scale 2
…	…
F010	Fill Input Data Area with scale 16 data
F100	Fill Input Data Area with status data of the system
F200	Scan of the 485 network. Useful if some scales are not connected and want check if they returned on-line.
F300	Rereading network settings from the scale 1 and scanning network. It also allows the change in the number of scales in the network, whether it varies in scale 1.
7Fxx	Enter the Output data area in the broadcast, in all scales of the subsystem 485 (with Modbus address zero)

Table 2-25. Commands

Commands in broadcast, do not provide feedback from the balance, they are actually carried out by all the scales. To ensure that they execute, control the outcome of the controls and counter balances.

2.11 Input Data

The Input Data area can be filled with different pages.

Page	Profibus Command (HEX) to Change Page
Network data page	F000
Scale 1 data	F001
...	…
Scale 16 data	F010
Network status	F100

Table 2-26. Input Data Area

2.12 Network Page Data

This page has the structure seen in Table 2-28.

Byte	Data
1	Scale 1 data (byte 1)
2	Scale 1 data (byte 2)
3	Scale 1 data (byte 3)
4	Scale 1 data (byte 4)
5	Scale 1 data (byte 5)
6	Scale 1 data (byte 6)
7	Scale 1 data (byte 7)
8	Scale 1 data (byte 8)
9	Scale 2 data (byte 1)

Byte	Data
10	Scale 2 data (byte 2)
11	Scale 2 data (byte 3)
12	Scale 2 data (byte 4)
13	Scale 2 data (byte 5)
14	Scale 2 data (byte 6)
15	Scale 2 data (byte 7)
16	Scale 2 data (byte 8)
…	…
121	Scale 16 data (byte 1)

Byte	Data
122	Scale 16 data (byte 2)
123	Scale 16 data (byte 3)
124	Scale 16 data (byte 4)
125	Scale 16 data (byte 5)
126	Scale 16 data (byte 6)
127	Scale 16 data (byte 7)
128	Scale 16 data (byte 8)

Table 2-27. Network Page Data

Byte	Data
1	Input/output status
2	Gross weight (B2)
3	Gross weight (B1)
4	Gross weight (B0)
5	Scale status
6	Net weight (B2)
7	Net weight (B1)
8	Net weight (B0)

Table 2-28. Single Scale Data

Bit	Data
0	Input 1 status
1	Input 2 status
2	Output 1 status
3	Output 2 status
4	Last command result (0: ok, 1: error)
6-5	Command counter (modulo 4)
7	Always 1 (scale present bit)

Table 2-29. Input/Output Status

Bit	Data
0	Net weight polarity
1	Gross weight polarity
2	Weight stability
3	Underload condition
4	Overload condition
5	Entered tare condition
6	Manual tare condition
7	Gross zero zone

Table 2-30. Scale Status

Note *SCALE 1...N PAGE DATA- Data are the same of the 1 to 1 function mode.*

Byte	Data
1	Number of the scales of the system
2	Scale 1 state
3	Scale 2 state
...	...
17	Scale 16 state
...	0
128	0

Table 2-31. Network Status Page

Value	Meaning
0	Scale not part of the network
1	Scale on-line
2	Scale off-line

Table 2-32. Scale State

To put a scale back on-line after it failed:

- Restart the module
- Execute by the Profibus master the command 0xF200
- Execute by the Profibus master the command 0xF300, after this command the module reads from scale 1, the network configuration, and sets as Input Data Area the Network Data page

Table 2-33 indicates the frequency, in the second reading, to update data in the input to each balance when the page with the data condensed balances network.

Baud rate	Scale 1	Scale 2	Scale 4	Scale 8	Scale 16
115200	54	27	13.6	6.8	3.6
57600	42	21.2	10.6	5.8	3
38400	40.8	20.4	10.2	5.2	2.6
19200	33	16.6	8.4	4.2	2.2
9600	20.4	10.2	5.2	2.6	1.4

Table 2-33. Scales Scan Rate

2.13 GSD File

Device name – DINIPB
Manufacturer ID – 0DE1
GSD Module: IN/OUT: 128 Byte (64 word) – 128 input bytes + 128 output bytes

2.14 EDS Ethernet/IP File

Device name – DINI NIC 50-RE/EIS
Manufacturer ID – 283
Product ID – 0x10D

Module Name	No.	Description
Input (T→O)	1	128 byte input area module
Output (O→T)	1	128 byte output area module
T = target O = originator		

Table 2-34. EDS Modules

Use the parameters in Figure 2-2 to setup a generic Ethernet module.

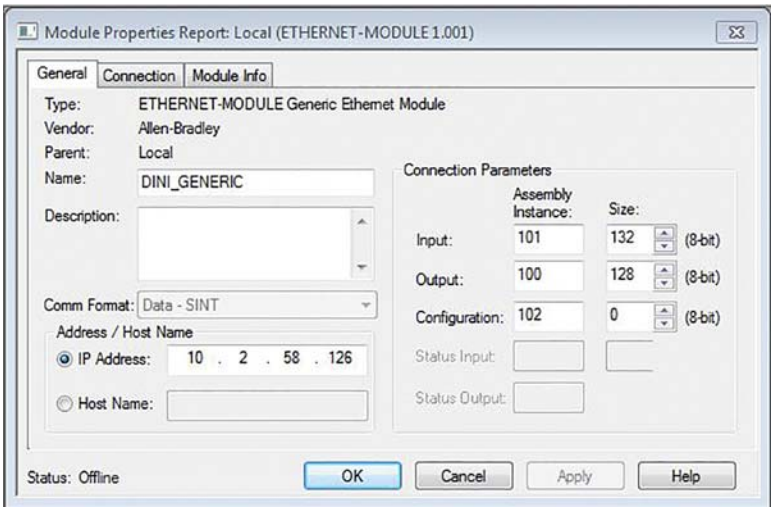

Figure 2-2. Generic Ethernet Module Setup

2.15 GSDML ProfiNet File

Device name – dini-xxx
Manufacturer ID – 011E
Product ID – 010A

Module Name	No.	Description
64 byte input	2	64 byte module for the input area
64 byte output	2	64 byte module for the output area

Table 2-35. GSDML Modules

2.16 ESI EtherCat File

Device name – DINI NIC 50-RE/ECS
Manufacturer ID – 0xE0000044
Product ID – 0x0000000B

Module Name	No.	Description
Input	1	200 byte module for the input area
Output	1	200 byte module for the output area

Table 2-36. ESI Modules

2.17 EDS CANopen File

Device name – DINI NIC 50-COS
Manufacturer ID – 0x00000044
Product ID – 1541540

Module Name	No.	Description
Input	64	8 bytes modules for the input area (TXPDU). Min. 4 TXPDU (32 byte)
Output	64	8 bytes module for the output area (RXPDU). Min. 4 RXPDU (32 byte)

Table 2-37. EDS Modules

2.18 EDS DeviceNet File

Device name – DINI Slim-DeviceNet NIC 50-DNS
Manufacturer ID – 283
Product ID – 35

Module Name	No.	Description
Input (Production)	1	128 byte module for the input area
Output (Consumption)	1	32 byte module for the output area

Table 2-38. EDS Modules

3.0 Troubleshooting

Messages displayed by the SCT when errors are present.

3.1 Profibus

At the first interrogation SCT by the module, the display shows the message PB.CONN, then there is no longer any message for the Profibus.

When the Profibus master connects, the yellow LED module illuminates.

3.2 Other Fieldbus

As soon as it is available to SCT, this displays the firmware version of the Hub in the form fr.xx.yy (where xx.yy is the release).

At the first interrogation SCT by the module the display shows the message Fb. Conn.

When communication between the module Hub and Fieldbus network is operational, Fb. OH displays.

If there is an error, Fb. Err and the error code alternates on the display.

If there is communication between the module and the SCT Hub, F. bUS. Er flashes on the display.

Message	Description
FbUS. Er	No connection received from module Hub after 30 second since system start
F. r. HH. YY	Firmware version of the module hub
F. b. Conn	Start the communication between hub module and scale
F. b. OH	Communication on Fieldbus network configured and running
F. b. Err + codE	Error state, see Table 3-2.

Table 3-1. Error Messages

Code	Description
1000	Fatal error in Hub module
1001	Inconsistency between protocol type selected and the one managed by the Hub module *Example: Hub type DeviceNet module with Profinet protocol selected on SCT*
1-18	Other fatal error in Hub module
000001	Unrecoverable error module Hub, see Table 3-3

Table 3-2. Error Code

Code	Description
000140	General network error
000141	Connection closed
000142	Time-out connection
000143	Isolated network
000144	Duplicated node
000145	Network cable disconnected

Table 3-3. Error of Network

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