



Ramsey
MINI CK101
Weight Integrator

PROFIBUS-DP Slave Protocol
Manual

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About this manual

The *PROFIBUS-DP Slave protocol* manual consists of three parts.

1. PROFIBUS OVERVIEW

1.1 *Introduction to the PROFIBUS*

The PROFIBUS born by the need to have an open, vendor independent communication system that allows to connect all the components used for the automation of technical processes.

The PROFIBUS is a standardized communication system, all its characteristics, rules and technical information are collected in the PROFIBUS DIN 19245 normative.

There are three main variation of PROFIBUS corresponding to the intended application: PROFIBUS-FMS , PROFIBUS-DP and PROFIBUS-PA.

1.2 *The PROFIBUS-DP*

This is the performance optimized version of PROFIBUS, specially dedicated to time-critical communication between automation system and distributed peripherals.

It is typically used to transfer I/O images between a main PLC and remote devices (normally sensors, actuators, transmitters). In this case it will be used to transfer (read and write) blocks of data also. PROFIBUS is a typical master/slave communication where the main PLC is the master and the remote devices are the slaves. It offers also the possibility to implement complex multi-master structures but this is not relevant for our purpose. The line is a 2 wires twinax cable, connection is EIA RS 485. Baud rate can be from 9,6 kbit/s up to 1,5 Mbit/s, length of the line is max 200 m at 1,5 Mbit/s extendible with repeaters.

1.3 *Data Transfer*

The interface between the Master and the Slave are structured in parameterization - configuration - and data transfer phase. In the parametrization and configuration phases each Slave compares its real configuration with the configuration data received from the Master. When verifying the configuration (device type, format and the length of information ...) has to be identical. This guarantees a protection against configuration fault. Only if these tests are successful the Slave can enter in the data exchange phase. Max number of data that it is possible to transfer at once in this phase is limited to 246 bytes (123 words).

1.4 *Protection mechanisms*

Besides the configuration check to avoid erroneous configurations, the Slave uses the Watch Dog control to detect failures on the bus. If a Slave recognizes no successful data transfer with the Master within the Watch Dog control interval, it generates an alarm condition.

2 IMPLEMENTATION ON THE MINICK 101

2.1 The 'PROFIBUS interface board'.

Connection to the PROFIBUS will be done through a dedicated optional board 'PROFIBUS interface board' provided with the SPC3 controller. The SPC3 is an integrated circuit produced by SIEMENS, it handles the interface with the Master up to 12 Mbit/s.

The PROFIBUS boards is provided by plug terminals 6 pin connector for RS485 connection. The board can be plugged into the instrument in the slot dedicated for the option. The software automatically will recognize it.

2.2 MINICK 101 configuration and test.

The slave address and the buffer dimensions should be defined on the instrument setup: 'MAIN MENU 5 - PROFIB scroll'.

Define here the address of the instrument in the PROFIBUS net.

- PROFIB SCROLL 1 - **Password: SERVICE**
Address
1
ENTER

Default:	1
Min	1
Max	126

In the next two scroll the user can define independently the read and write buffer dimensions. This possibility is very useful since it allows to reduce the address space to allocate the instrument to the minimum needed.

The dimension should be entered in number of words. This number includes also the header of the telegram (see Tab 2.1) that takes 4 words , so the minimum is 5 words.

- PROFIB SCROLL 2 - **Password: SERVICE**
Read buffer dim
48 words
ENTER

Default:	48
Min	5
Max	48

- PROFIB SCROLL 3 -
Write buffer dim
48 words
ENTER

Password: SERVICE

Default:	48
Min	5
Max	48

In the TEST SCROLL it is possible to check the actual status of the communication.

- TEST SCROLL 8 -
Test communication B
19.2 kb Wait Prm

Password: SERVICE

In the third line the baud rate and status are dynamically displayed. The status can be:

WAIT PRM	it is waiting for the PARAMETER message
WAIT CFG	it is waiting for the CONFIGURATION message
DATA EXC	it is in the DATA EXCHANGE phase , configuration and parametrization have been completed successfully.

The baud rate is automatically detected by the instrument, if the displayed value changes continuously it means that there are problems on the line or the CPU is OFF.

2.3 Data transfer

During the communication activity, the MINICK 101 will always act as Slave, meaning that it will respond to a request from a Master device on the line, but will never attempt to send messages out.

The PROFIBUS interface allows a remote intelligent device to read and write data from and to the instrument. Data is organized in registers, some of them are read only others write only groups.

The master has the possibility to perform two type of operations: write data and read data. The first simply consists in sending to the MINI CK101 the values to write in the registers together with indications to identify what registers have to be write. In the second case the procedure can be a little more complex since the reading operation can be proceeded by a write operation to tell to the MINI CK101 what registers should be read. Write and read operation are explained in detail below.

Write operations – Single register

A typical structure of the telegram for the *Writing* single operation, is shown below

elem. #	register	type	offset (bytes)	note
1	Stamp	integer	0	See below
2	Slave Address	Integer	1	According to the Instrument
3	Function	Integer	2	Write 06 (Hex) – Single
4	Register Address HI	Integer	3	Register to write
5	Register Address LO	Integer	4	Register to write
6	Data HI	Integer	5	Data to write
7	Data LO	Integer	6	Data to write

Tab.1

Write operations – Multiple registers

A typical structure of the telegram for the *Writing* multiple operation, is shown below

elem. #	register	type	offset (bytes)	Note
1	Stamp	integer	0	See below
2	Slave Address	Integer	1	According to the Instrument
3	Function	Integer	2	Write 10 (Hex) – Multiple
4	Register Address HI	Integer	3	Start register
5	Register Address LO	Integer	4	Start register
6	Nr.of register HI	Integer	5	Numbers of registers to write (words)
7	Nr.of register LO	Integer	6	Numbers of registers to write(words)
8	Bytes count	Integer	7	Numbers of bytes to write
9	Data HI	Integer	8	Data to write
10	Data LO	Integer	9	Data to write
11	Data HI	Integer	10	Data to write
12	Data LO	Integer	11	Data to write

Tab.2

In the PROFIBUS protocol, data are transmitted continuously. So the same telegram is sent by the master to the slave more times. To avoid that the slave interprets continuously the same data (it would create problem also, for examples with the commands), the *stamp* is used. The slave interprets received data only if the stamp is different from the stamp received in the previous telegram. The master has only to change the stamp value when it create a new telegram. The stamp of the last interpreted telegram is re-transmitted by the instrument in the read buffer.

The '*Data*' section contains the data to write in the order MSB - LSB.

When the MINI CK 101 processes the 'package', before to write the received data in the registers, it checks that all the parameters are correct and the data to write do not overlaps specified max and min limit (each writeable register has own max and min limit, see table 3.1.).

If it detects errors the write operation fails, a DIAGNOSTICS message will be activated.

Read operations

A typical structure of the telegram for the *Reading* operation, is shown below

elem. #	register	type	offset (bytes)	note
1	Stamp	integer	0	See below
2	Slave Address	Single	1	According to the Instrument
3	Function	Single	2	Read 03 (Hex)
4	Register Address HI	Single	3	
5	Register Address LO	Single	4	
6	Data HI	Integer	5	If the register is a "floating point" type the register is doubled
7	Data LO	integer	6	If the register is a "floating point" type the register is doubled

Tab. 3

In the PROFIBUS protocol the master continuously reads data from slave.

the MINI CK 101 will remember which registers have been required the last time and it will continue to update the read buffer with their actual values.

What the Master will receive after a read operation is a buffer of data having the same structure of the write telegram (see paragraph above).

2.4 Timings

The instrument updates almost all its basic variables (e.g. weight, rate, totals ...) each 100 milliseconds. With the

same frequency the instrument updates the read buffer. If the master performs more communications in this period, it will receive more time the same data.

The write request are interpreted by the instrument in polling with a period of 100 milliseconds.

2.5. Communication errors

The alarm condition 'PROFIBUS comm. error' is activated by the instrument in two conditions:

- If the SPC3 controller installed on the 'PROFIBUS interface board' recognizes no successful data transfer within the watch dog control interval.
- If the received data contains errors (value overlaps limits, register number does not exist, group number does not exist ...)

The alarm can be defined as SHUT DOWN and the shut down digital output can be used to set the system in safety condition.

In the second case the instrument also activates an EXPANDED DIAGNOSTIC request to the master.

2.5.1. Diagnostics data

The Master system has the possibility to detect a 'communication error' condition by checking the diagnostics. In case of error the MT2000 will activate the request for diagnostic acquisition indicating that expanded device related diagnostics data are present.

When the master requires the diagnostics it will get:

Byte	Bit position								Diagnostics data
	7	6	5	4	3	2	1	0	
0									StatStatus1
1									StatStatus2
2									StatStatus3
3									MasterAdd
4									IdentNumberHigh
5									IdentNumberLow
6	0	0	0	0	0	0	1	0	Ext Diag - Header
7	0	0	0	0	GE	RE	LE	CE	Ext Diag - Data

Tab. 4 - Composition of the diagnostics data

GE Group Error

Invalid group identifier, the group does not exist

RE	Register number Error	The number of requested registers is wrong
LE	Limits Error	A write operation has been performed but the value to write overlaps the limits.
CE	Coherency Error	The Master has tried to write or read partially a variable composed by more registers (e.g. only one word of a floating variable)

Refer to DIN 19245 Part 3 for details about the meaning of the first 5 bytes.

3 REGISTERS LIST

3.1 Description of the variables

The Table 1 of the next pages, lists the variables accessible by the Master specifically for the **MINI CK 101 Integrator**.

It is necessary at this point make a distinction between register and variables.

A *register* is the basic unit of the data at which the Master can access. The groups are structured in registers, they are numbered and the identification number is used by the Master to identify the portion of a group to read or write. Their dimension is always one word.

A *variable* is the format of storing of the data in the instrument memory. Its dimension can change depending by the variable type, we can have:

INTEGER variable	An integer is a variable of 1 word (1 register). It contains integer values in the ranges 0 to 65535 or +32767 to -32768. The integer variables can be structured in array of integers with various dimensions.
FLOAT variable	A float is a variable of two words (2 register). It contains REAL values in the single precision IEEE format (See Appendix A at the end of this document). The single precision format can represent values in the range $3.4 \cdot 10^{+38}$ to $1.18 \cdot 10^{-38}$
LONG variable	A float is a variable of two words (2 register). It contains REAL values in the

NOTE

A lot of real values are displayed on the instrument with a number of decimals that depends by the selected division. For what regards the communication, instrument always sends the value with all the decimals.

For example:

Net weight	Displayed value:	10.2
	Sent value:	10.179982

LEGEND:

Register	Conventional name
Type	Can be: RO The register can be read but can not be written. It will be inserted only in the read groups. RW The register can be read or written. It will be found either in the read or in the write groups. WO The register can only be written. It will be inserted only in the read groups.
Low limit	Minimum acceptable value for the variable. Lower values are considered as errors.
High limit	Maximum acceptable value for the variable. Higher values are considered as errors.
Refresh t.	Time between two updates of the variable in the instrument's memory.
format	Can be: char , integer, float or double
Address (word)	Number of word (decimal) in the mapping, at which the register can be found.
Note	Comments and/or special info on use.

3.2 List of registers

Register	Type	Low Limit	High Limit	Refresh Time [ms]	Format	Address (word)	Note
Simulation Key	WO	(**)	(**)	-	Integer	0	
Write flag	RO	0	(*)	-	Integer	1	
DISPLAY DATA							
Display (1)	RO	-	-	200	Integer	2	
Display (2)	RO	-	-	200	Integer	3	
Display (3)	RO	-	-	200	Integer	4	
Display (4)	RO	-	-	200	Integer	5	
Display (5)	RO	-	-	200	Integer	6	
Display (6)	RO	-	-	200	Integer	7	
Display (7)	RO	-	-	200	Integer	8	
Display (8)	RO	-	-	200	Integer	9	
Display (9)	RO	-	-	200	Integer	10	
Display (10)	RO	-	-	200	Integer	11	
Display (11)	RO	-	-	200	Integer	12	
Display (12)	RO	-	-	200	Integer	13	
Display (13)	RO	-	-	200	Integer	14	
Display (14)	RO	-	-	200	Integer	15	
Display (15)	RO	-	-	200	Integer	16	
Display (16)	RO	-	-	200	Integer	17	
Display (17)	RO	-	-	200	Integer	18	
Display (18)	RO	-	-	200	Integer	19	
Display (19)	RO	-	-	200	Integer	20	

(*) Max limit is the number of digital inputs, it depends by the hardware configuration of the instrument.

(**) All the values are accepted but only a specific set of codes are interpreted as keys. See description of the variable.

Register	Type	Low Limit	High Limit	Refresh Time [ms]	Format	Address (word)	Note
Display (20)	RO	-	-	200	Integer	21	
Display (21)	RO	-	-	200	Integer	22	
Display (22)	RO	-	-	200	Integer	23	
Display (23)	RO	-	-	200	Integer	24	
Display (24)	RO	-	-	200	Integer	25	
Display (25)	RO	-	-	200	Integer	26	
Display (26)	RO	-	-	200	Integer	27	
Display (27)	RO	-	-	200	Integer	28	
Display (28)	RO	-	-	200	Integer	29	
Display (29)	RO	-	-	200	Integer	30	
Display (30)	RO	-	-	200	Integer	31	
Display (31)	RO	-	-	200	Integer	32	
Display (32)	RO	-	-	200	Integer	33	
Display (33)	RO	-	-	200	Integer	34	
Display (34)	RO	-	-	200	Integer	35	
Display (35)	RO	-	-	200	Integer	36	
Display (36)	RO	-	-	200	Integer	37	
Display (37)	RO	-	-	200	Integer	38	
Display (38)	RO	-	-	200	Integer	39	
Display (39)	RO	-	-	200	Integer	40	
Display (40)	RO	-	-	200	Integer	41	
STATUS AND DIAGNOSTIC DATA							
Panel Leds	RO	-	-	200	Integer	42	
Status (1)	RO	-	-	-	Integer	43	
Status (2)	RO	-	-	-	Integer	44	
Alarms (1)	RO	-	-	100	Integer	45	
Alarms (2)	RO	-	-	100	Integer	46	

Register	Type	Low Limit	High Limit	Refresh Time [ms]	Format	Address (word)	Note
Alarms (3)	RO	-	-	100	Integer	47	
In / Out image	RO	-	-	100	Integer	48	
Commands	RW	0	0xffff	100	Integer	49	
Virtual Inputs Image	RW	0	0xffff	100	Integer	50	
Virtual Outputs Image	RO	-	-	100	Integer	51	
DYNAMIC DATA							
Batch Counter	RO	-	-	200	Integer	54	
Batch Set	RW	0	10000	200	Float	55	
Belt Rate	RO	-	-	200	Float	57	
Belt Load	RO	-	-	100	Float	59	
Belt Speed	RO	-	-	200	Float	61	
Master Total	RO	-	-	100	float	63	
Operator Total	RW	0	0	100	Float	65	
Reset Total	RW	0	0	100	float	67	
Batch Total	RO	-	-	100	float	69	
Master Total Double	RO	-	-	100	double	71	
Operator Total Double	RW	0	0	100	double	75	
Reset Total Double	RW	0	0	100	double	79	
Batch Total Double	RW	0	0	100	double	83	
Manual Zero	RW	0	120000	-	long	89	
Manual Span	RW	500000	45000000	-	float	91	
DISPLAY DATA MENU							
Units	RW	Tab.7	Tab.7	-	integer	95	
Total units	RW	Tab.8	Tab.8	-	integer	96	
Length units	RW	Tab.9	Tab.9	-	integer	97	
Rate units	RW	Tab.10	Tab.10	-	integer	98	
Weight units	RW	Tab.11	Tab.11	-	integer	99	

Register	Type	Low Limit	High Limit	Refresh Time [ms]	Format	Address (word)	Note
Language	RW	Tab.12	Tab.12	-	integer	100	
Time Format	RW	Tab.13	Tab.13	-	integer	101	
Date Format	RW	Tab.14	Tab.14	-	integer	102	
Line 3 Display	RW	Tab.15	Tab.15	-	integer	103	
Rate Damping	RW	0	400	-	integer	104	
Load Damping	RW	0	400	-	integer	105	
Speed Damping	RW	0	400	-	integer	106	
SCALE DATA MENU							
Scale Capacity	RW	1	200000	-	float	109	
Scale Division	RW	Tab.16	Tab.16	-	integer	111	
Scale Model	RW	0	10000	-	integer	112	
Idler Space	RW	Tab.17	Tab.17	-	float	113	
Angle	RW	-25	+25	-	float	115	
Load Cell Capacity	RW	Tab.18	Tab.18	-	float	117	
Load Cell Sensitivity	RW	0.5	3.5	-	float	119	
Load Cell Resistance 1	RW	10	2000	-	float	121	
Load Cell Resistance 2	RW	10	2000	-	float	123	
Load Cell Resistance 3	RW	10	2000	-	float	125	
Load Cell Resistance 4	RW	10	2000	-	float	127	
Load Cell Resistance 5	RW	10	2000	-	float	129	
Load Cell Resistance 6	RW	10	2000	-	float	131	
Speed Input	RW	Tab.19	Tab.19	-	integer	133	
Dead Band	RW	0.0	5.0	-	float	134	
CALIBRATION DATA MENU							
Calibration Mode	RW	Tab.20	Tab.20	-	Integer	138	

Register	Type	Low Limit	High Limit	Refresh Time [ms]	Format	Address (word)	Note
Calibration Resistance	RW	10	1000000	-	long	139	
Calibration Constant	RO	-	-	-	float	141	
Chain Weight	RW	Tab.21	Tab.21	-	float	143	
Chain Constant	RO	-	-	-	float	145	
Test Weight	RW	Tab.22	Tab.22	-	float	147	
Weight Constant	RO	-	-	-	float	149	
Calibration Interval	RW	0	365	-	integer	151	
Rcal Factor	RW	-99.99	+99.99	-	float	152	
Chain Factor	RW	-99.99	+99.99	-	float	154	
Weight Factor	RW	-99.99	+99.99	-	float	156	
Test Duration Length	RW	1	100000	-	float	158	
Test Durat. Leng. Full	RW	Tab.23	Tab.23	-	float	160	
Test Durat. Leng. Part.	RW	Tab.24	Tab.24	-	float	162	
Test Durat. Leng. Man.	RW	Tab.25	Tab.25	-	float	164	
Test Duration revs.	RW	1	100	-	integer	166	
Test Duration Time	RW	10	16200	-	integer	167	
Azt opt.	RW	Tab.26	Tab.26	-	Integer	168	
Azt Range	RW	0.0	10.0	-	float	169	
Azt Deviation	RW	0.0	10.0	-	float	171	
Speed Capacity	RW	Tab.27	Tab.27	-	float	173	
Calibration Number	RW	1	2	-	Integer	175	
Protection Level	RO	-	-	-	Integer	178	
DIAGNOSTIC MENU							
AD Gross	RO	-	-	-	long	179	
AD Net	RO	-	-	-	long	181	

Register	Type	Low Limit	High Limit	Refresh Time [ms]	Format	Address (word)	Note
Weight Load Cell	RO	-	-	-	float	183	
Zero Load Cell	RW	0	10000	-	integer	185	
Span Load Cell	RW	0	30000	-	integer	186	
Prescaler	RO	-	-	-	integer	187	
Test Duration Pulses	RW	1	1000000	-	long	188	
Test Duration Length	RW	1	100000	-	float	190	
Service Password	RW	Tab.28	Tab.28	-	Integer	192	
Operator Password	RW	Tab.29	Tab.29	-	integer	197	
Software version	RO	-	-	-	integer	202	
I/O DATA MENU							
Analog Out Definition	RW	Tab.30	Tab.30	-	integer	210	
Analog Out Range	RW	Tab.31	Tab.31	-	integer	211	
Analog Out Delay Leng.	RW	Tab.32	Tab.32	-	float	212	
Analog Out Delay Time	RW	0	300	-	integer	214	
Analog Out Filter	RW	0	400	-	integer	215	
Digital input 1 assign	RW	Tab.33	Tab.33	100	integer	216	
Digital input 2 assign	RW	Tab.33	Tab.33	100	integer	217	
Digital input 3 assign	RW	Tab.33	Tab.33	100	integer	218	
Digital input 4 assign	RW	Tab.33	Tab.33	100	integer	219	
Digital input 5 assign	RW	Tab.33	Tab.33	100	integer	220	
Digital input 6 assign	RW	Tab.33	Tab.33	100	integer	221	
Digital input 7 assign	RW	Tab.33	Tab.33	100	integer	222	
Digital input 8 assign	RW	Tab.33	Tab.33	100	integer	223	
Digital input 9 assign	RW	Tab.33	Tab.33	100	integer	224	
Digital input 10 assign	RW	Tab.33	Tab.33	100	integer	225	
Digital input 11 assign	RW	Tab.33	Tab.33	100	Integer	226	

Register	Type	Low Limit	High Limit	Refresh Time [ms]	Format	Address (word)	Note
Digital input 12 assign	RW	Tab.33	Tab.33	100	integer	227	
Digital output 1 assign	RW	Tab.34	Tab.34	100	integer	228	
Digital output 2 assign	RW	Tab.34	Tab.34	100	integer	229	
Digital output 3 assign	RW	Tab.34	Tab.34	100	integer	230	
Digital output 4 assign	RW	Tab.34	Tab.34	100	integer	231	
Digital output 5 assign	RW	Tab.34	Tab.34	100	integer	232	
Digital output 6 assign	RW	Tab.34	Tab.34	100	integer	233	
Digital output 7 assign	RW	Tab.34	Tab.34	100	integer	234	
Digital output 8 assign	RW	Tab.34	Tab.34	100	integer	235	
Digital output 9 assign	RW	Tab.34	Tab.34	100	integer	236	
Digital output 10 assign	RW	Tab.34	Tab.34	100	integer	237	
Digital output 11 assign	RW	Tab.34	Tab.34	100	integer	238	
Digital output 12 assign	RW	Tab.34	Tab.34	100	integer	239	
Digital output 13 assign	RW	Tab.34	Tab.34	100	integer	240	
Digital output 14 assign	RW	Tab.34	Tab.34	100	integer	241	
Digital output 15 assign	RW	Tab.34	Tab.34	100	integer	242	
Digital output 16 assign	RW	Tab.34	Tab.34	100	integer	243	
Totalizer Out. Pulse	RW	0.001	100.0	100	float	244	
Totalizer Out. Duration	RW	0.005	1.0	100	float	246	
Clip Detection Mode	RW	Tab.35	Tab.35	100	Integer	248	
Clip Detection Length	RW	Tab.36	Tab.36	100	float	249	
ALARMS THRESHOLDS MENU							
Rate dev. Opt.	RW	Tab.37	Tab.37	-	integer	253	

Register	Type	Low Limit	High Limit	Refresh Time [ms]	Format	Address (word)	Note
Low rate delay	RW	0	90	-	integer	254	
Low rate set	RW	0	105 %	-	float	255	
High rate delay	RW	0	90	-	integer	257	
High rate set	RW	0	150 %	-	float	258	
Load dev. Opt.	RW	Tab.38	Tab.38	-	integer	260	
Low load delay	RW	0	90	-	integer	261	
Low load set	RW	0	105 %	-	float	262	
High load delay	RW	0	90	-	integer	264	
High load set	RW	0	200 %	-	float	265	
Speed dev. Opt.	RW	Tab.39	Tab.39	-	integer	267	
Low speed delay	RW	0	90	-	integer	268	
Low speed set	RW	0	105 %	-	float	269	
High speed delay	RW	0	90	-	integer	271	
High speed set	RW	0	150 %	-	Float	272	
ALARMS MENU							
Alarm define 1	RW	Tab.40	Tab.40		integer	276	
Alarm define 2	RW	Tab.40	Tab.40		integer	277	
Alarm define 3	RW	Tab.40	Tab.40		integer	278	
Alarm define 4	RW	Tab.40	Tab.40		integer	279	
Alarm define 5	RW	Tab.40	Tab.40		integer	280	
Alarm define 6	RW	Tab.40	Tab.40		integer	281	
Alarm define 7	RW	Tab.40	Tab.40		integer	282	
Alarm define 8	RW	Tab.40	Tab.40		integer	283	
Alarm define 9	RW	Tab.40	Tab.40		integer	284	
Alarm define 10	RW	Tab.40	Tab.40		Integer	285	
Alarm define 11	RW	Tab.40	Tab.40		integer	286	
Alarm define 12	RW	Tab.40	Tab.40		integer	287	

Register	Type	Low Limit	High Limit	Refresh Time [ms]	Format	Address (word)	Note
Alarm define 13	RW	Tab.40	Tab.40		integer	288	
Alarm define 14	RW	Tab.40	Tab.40		integer	289	
Alarm define 15	RW	Tab.40	Tab.40		integer	290	
Alarm define 16	RW	Tab.40	Tab.40		integer	291	
Alarm define 17	RW	Tab.40	Tab.40		integer	292	
Alarm define 18	RW	Tab.40	Tab.40		integer	293	
Alarm define 19	RW	Tab.40	Tab.40		integer	294	
Alarm define 20	RW	Tab.40	Tab.40		integer	295	
Alarm define 21	RW	Tab.40	Tab.40		integer	296	
Alarm define 22	RW	Tab.40	Tab.40		integer	297	
Alarm define 23	RW	Tab.40	Tab.40		integer	298	
Alarm define 24	RW	Tab.40	Tab.40		integer	299	
Alarm define 25	RW	Tab.40	Tab.40		integer	300	
Alarm define 26	RW	Tab.40	Tab.40		integer	301	
Alarm define 27	RW	Tab.40	Tab.40		integer	302	
Alarm define 28	RW	Tab.40	Tab.40		integer	303	
Alarm define 29	RW	Tab.40	Tab.40		integer	304	
Alarm define 30	RW	Tab.40	Tab.40		integer	305	
NET MENU							
I.P. Address	RW	0.0.0.0	254.255.255.255	-	integer	308	
Net Mask Address	RW	0.0.0.0	255.255.255.255	-	integer	316	
Variables selection	RW	Tab.41	Tab.41	-	integer	324	
Swap integer data	RW	Tab.42	Tab.42	-	integer	325	
Swap float data	RW	Tab.43	Tab.43	-	integer	326	
PROFIBUS MENU							
Address	RW	1	126	-	integer	339	
Read Buffer Length	RW	5	48	-	integer	340	
Write Buffer Length			48				

Register	Type	Low Limit	High Limit	Refresh Time [ms]	Format	Address (word)	Note
	RW	5		-	integer	341	
LOAD OUT MENU							
Batch Option	RW	Tab.44	Tab.44	-	integer	357	
Preset	RW	0	10000	-	float	358	
CutOff Corr	RW	Tab.45	Tab.45	-	integer	360	
CutOff queue	RW	0	10000	-	float	361	
CutOff Len	RW	Tab.46	Tab.46	-	float	363	
CutOddDev	RW	0	10000	-	float	365	
Start Delay	RW	0	600	-	integer	367	
Stabilization Time	RW	0	600	-	integer	368	
Batch Deviation	RW	0	100	-	integer	369	

Tab. 5 – Variables list

3.3 Description of Registers

Below the description of the register and their use.

Sim_Key The master has the possibility to send a key code to the instrument. Interpreted key codes are:

Key	Key Code	Key	Key Code
UP ARROW	0048 H	F1	003F H
DOWN ARROW	0050 H	F2	0040 H
RUN	0052 H	F3	0041 H

Tab 6 - key codes

Write Flag Set to 0 after a message has been received and properly processed. If a message is correctly received but cannot be processed because password protection or size error, this flag is set to 1. The user may read this register after a write message to ensure the data have been accepted.

Display

Contains the messages actually shown on the display of the instrument in form of an ASCII string. For example the following screen:

- MENU MAIN 1 -		
PRESS MENU FOR MORE		
ZERO	SPAN	MAT'L
CAL	CAL	CAL

Will be stored in registers in the following way:

Display(1)	2DH	20H	Characters 1 and 2 from left of first row
Display(2)	4DH	45H	
Display(3)	4EH	55H	
Display(4)	20H	4DH	
Display(5)	41H	49H	
Display(6)	4EH	20H	
.....			
Display(10)	....	....	Characters 19 and 20 from left of first row
Display (11)	....	....	Characters 1 and 2 from left second row
.....			
Display(20)	....	....	Characters 19 and 20 from left of second row
Display(21)	....	....	Characters 1 and 2 from left of third row
.....			
Display(30)	....	....	Characters 19 and 20 from left of third row
Display(31)	....	....	Characters 1 and 2 from left of fourth row
.....			
Display(38)	4CH	20H	
Display(39)	20H	20H	
Display(40)	20H	20H	Characters 19 and 20 from left of fourth row

3.3.1 Status

Panel Leds

The word below indicates the status of the 5 leds on the front panel of the instrument.

Panel Led

NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	04	03	02	01	00
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

PL1.04 Run Led
PL1.03 Span Led
PL1.02 Zero Led
PL1.01 Ready Led
PL1.00 Alarm Led

Status

The actual status of the instrument is resumed in two words, each bit has an own

meanings, when the bit is 1 the associated status is true.

Status 1 - Generals

15	14	13	NU	NU	10	NU	08	07	06	05	04	03	02	NU	NU
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

S1.15 Cumulative shut down	S1.07 High load
S1.14 Cumulative Alarms	S1.06 Low load
S1.13 Calibration running	S1.05 High rate
S1.12 Free	S1.04 Low rate
S1.11 Free	S1.03 High speed
S1.10 Running	S1.02 Low speed
S1.09 Free	S1.01 Free
S1.08 Ready	S1.00 Free

Status 2 - Control deviations & Batch

NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	03	02	01	00
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

Only applicable if Load Out option installed :

S2.03	S2.02	S2.01	S2.00	
x	0	0	0	Batch not running
x	0	0	1	Not used
x	0	1	0	Batch running at high rate
x	0	1	1	Batch running at low rate
x	1	0	0	Waiting start delay time
x	1	0	1	Waiting stabilization time
1	x	x	x	Batch suspended

x can be : 0 Normal status
1 Stand by status

S2.15 Free	S2.07 Free
S2.14 Free	S2.06 Free
S2.13 Free	S2.05 Free
S2.12 Free	S2.04 Free
S2.11 Free	
S2.10 Free	
S2.09 Free	
S2.08 Free	

Alarms

In the alarms register, each bit represents the status of an alarm. If the alarm is active, the relevant bit will contain '1', otherwise it will contain '0'.

Alarms 1

NU	14	NU	NU	11	10	09	08	07	06	05	04	03	02	01	00
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

A1.15 Free	A1.07 LOW RATE
A1.14 CELL FAIL	A1.06 HIGH SPEED

A1.13 Free
 A1.12 Free
 A1.11 SPEED SENSOR ERROR
 A1.10 HIGH LOAD
 A1.09 LOW LOAD
 A1.08 HIGH RATE

A1.05 LOW SPEED
 A1.04 WARM START
 A1.03 COLD START
 A1.02 PWD DURING CALIB
 A1.01 CAL TIME ELAPSED
 A1.00 EXTERNAL ALARM

Alarms 2

NU	NU	13	12	11	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

A2.15 Free
 A2.14 Free
 A2.13 OVERFLOW TOTALIZER
 A2.12 AZT OVER LIMIT
 A2.11 BATCH DEVIATION
 A2.10 Free
 A2.09 Free
 A2.08 Free

A2.07 Free
 A2.06 Free
 A2.05 Free
 A2.04 Free
 A2.03 Free
 A2.02 Free
 A2.01 Free

Alarms 3

15	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

A3.15 PROFIB COMM ERROR
 A3.14 Free
 A3.13 Free
 A3.12 Free
 A3.11 Free
 A3.10 Free
 A3.09 Free
 A3.08 Free

A3.07 Free
 A3.06 Free
 A3.05 Free
 A3.04 Free
 A3.03 Free
 A3.02 Free
 A3.01 Free
 A3.00 Free

I/O Image

The instrument has physical inputs and outputs to which logical input and output functions are associated. As far as communication is concerned, only the status of physical inputs and outputs are transferred.

Input Image – Inputs installed on board

NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	01	00
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

I1.01 in 2 - mother board
 I1.00 in 1 - mother board

Output Image – Outputs installed on board

NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	04	03	02	01	00
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

O1.04 output 5 - mother board
 O1.03 output 4 - mother board
 O1.02 output 3 - mother board
 O1.01 output 2 - mother board

O1.00 output 1 - mother board

Commands

Each bit of the commands register is specified as follows. In order to give a command, the Host must set the relevant bit to 1 and write (send) the register to the instrument. The action will be performed if the write message is accepted.

Commands

15	NU	NU	NU	NU	10	09	08	07	06	05	04	03	02	01	00
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

C1.15 SAVE SETUP DATA	C1.07 REMOTE SPAN CALIBR. (CHAIN)
C1.14 NOT USED	C1.06 REMOTE SPAN CALIBR. (WTS)
C1.13 NOT USED	C1.05 REMOTE START ZERO
C1.12 NOT USED	C1.04 CONFIRM ZERO / SPAN
C1.11 NOT USED	C1.03 STANDBY BATCH
C1.10 CLEAR OPER. TOTAL	C1.02 STOP BATCH
C1.09 CLEAR RESET TOTAL	C1.01 START BATCH
C1.08 REMOTE SPAN CALIBR. (RCAL)	C1.00 RESET ALARM

Calibration commands:

It is possible to start a calibration function from remote. At the end of the calibration (calibration flag in status registers should be tested to determines when cal function ends) it is possible to verify the calibration error ('cal_error' register) and eventually accept the new zero or span.

Autospan RCAL Start the autospan function with RCAL method. The Rcal is automatically connected by the instrument at the begin of the function and disconnected at its end. This operation needs a delay of 0.5 seconds. In case a RCAL remote calibration is aborted , the calibration flags will turn off after this delay.

Autospan WTS Start the autospan function with WTS method. An output of the MiniCK can be programmed to automatically load the test weights, this adds a 10 seconds delay at the begin and at the end of the calibration function. In case a WTS remote calibration is aborted , the calibration flags will turn off after this time.

Autozero Start the autozero function.

Confirm zero/span (C1.04) at the end of the calibration function tells to the instrument to save the new zero or span. If this command is sent during a remote calibration it aborts the running function.

Batch commands:

The batch can be controlled by PROFIBUS :

Stop Batch Temporarily stops a Load Out (batch) sequence. Batch can resume if a Start command is sent later.

Abort Batch Definitively interrupt a Load Out (batch) sequence.

Start Batch Starts a Load Out (batch) sequence.

Reset Commands

When the instrument receives a 'Clear Reset total' or a 'Reset alarm' command, it executes the command for all the scales.

- Clear Operator total* Clear the operator total register.
- Clear Reset total* Clear the reset total register.
- Reset Alarms* Reset any pending alarm

In order to give a command, the Host must set the relevant bit to 1 and write (send) the register to the instrument. The action will be performed if the write message is accepted.

Virtual I/O Image

To allow an easy management when the MINI CK 101 is connected to a network, is possible to perform the I/O exchange only at level software, without using the available hardware I/O . Two words are dedicated for this function one for the Inputs and one for the outputs according the mapping and description below.

Virtual Input Image

NU	NU	NU	NU	11	10	09	08	07	06	05	04	03	02	NU	00
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

VI1.15	Free	VI1.07	Start batch
VI1.14	Free	VI1.06	Clip detect
VI1.13	Free	VI1.05	Auto zero
VI1.12	Free	VI1.04	Reset alarms
VI1.11	Calib. 2	VI1.03	Reset totals
VI1.10	Calib. 1	VI1.02	Belt running
VI1.09	Stand-by batch	VI1.01	Free
VI1.08	Stoop batch	VI1.00	Ext. Input

Virtual Output Image

15	14	NU	12	11	10	09	08	07	06	05	04	03	02	01	00
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

VO1.16	Cumul. Rate Deviation	VO1.07	High Speed
VO1.14	Cumul. Deviation Alarm	VO1.06	Low Rate
VO1.15	Load Test weight	VO1.05	High Rate
VO1.13	Free	VO1.04	Low Load
VO1.12	Batch High Rate	VO1.03	High Load
VO1.11	Batch Low Rate	VO1.02	Ready
VO1.10	Totalizer	VO1.01	Cumulative Shut down
VO1.08	Low Speed	VO1.00	Cumulative Alarm

3.3.2 Dynamic Values

Batch Counter	The number of the currently running load out or the number of the last finished one. The integrator automatically increments the batch number when a new batch is started.
Batch_Set	The set point for the current or the next load out. Usually entered or downloaded by the user. For reading operations, the Batch_set value is updated only when a batch is started.
Rate	The instantaneous rate in engineering units as currently displayed on the RUN screen.
Belt Load	The instantaneous linear weight in engineering units.
Belt Load	The instantaneous belt speed in engineering units.
Master Total	The current value of the master Totalizer of the integrator.
Operator Total	The current value of the operator Totalizer of the integrator. Operator total can be zeroed by writing zero to this register.
Reset Total	The current value of the reset Totalizer of the integrator. Reset total can be zeroed by writing zero to this register.
Batch Total	The current contents of the load out totalizer. Usually read at end of batch to check the result of the load out. This register is automatically cleared when a new batch is started
Master Total	The current value of the master Totalizer of the integrator, in double format
Operator Total	The current value of the Operator Totalizer of the integrator, in double format
Reset Total	The current value of the Reset Totalizer of the integrator, in double format
Batch Total	The current value of the Batch Totalizer of the integrator, in double format
Manual Zero	The value in engineering units of the “Zero” constant of the scale.
Manual Span	The value in engineering units of the “Span” constant of the scale.

3.3.3 Display Data

Units

Code of the “Measure Units” displayed according the table below:

SETTINGSs	CODE
METRIC	00H
ENGLISH	01H
MIXED	02H

Tab 7 – Units codes

Total Units

Code of the “Totalization Units” displayed according the table below:

SETTINGSs	CODE
KG	00H
TONNES	01H
POUNDS	02H
TONS	03H
LTONS	04H

Tab 8 – Total units code

Length Units

Code of the “Lenght Units” displayed according the table below:

SETTINGSs	CODE
METERS	00H
FEET	01H

Tab 9 – Length unit codes

Rate Units

Code of the “Rate Units” displayed according the table below:

SETTINGSs	CODE
PERCENT %	00H
KG/H	01H
t/H	02H
LB/H	03H
TPH	04H
LTPH	05H
KG/MN	06H
t/MN	07H
LB/MN	08H
T/MN	09H
LT/MN	0AH

Tab 10 – Rate units codes

Weight Units

Code of the “LoadCells Units” displayed according the table below:

SETTINGSs	CODE
KG	00H
POUNDS	02H

Tab 11 – Weight units codes

Language

Code of the setted “Language” according the table below

SETTINGSs	CODE
USA	00H
SPANISH	01H
ITALIAN	02H
FRENCH	03H
GERMAN	04H
DUTCH	05H

Tab 12 – Language code

Time Format

Code of the setted “Time Format” according the table below:

SETTINGSs	CODE
12H	00H
24H	01H

Tab 13 – Time format codes

Date Format

Code of the setted “Date Format” according the table below:

SETTINGSs	CODE
GG-MM-YYYY	00H
MM-GG-YYY	01H

Tab 14 – Date format codes

Line 3 Display

Code of the setted “Line 3 Display” according the table below:

SETTINGSs	CODE
SPEED	00H
LOAD	01H
<i>Not Used</i>	02H
NO DISPLAY	03H

Tab 15 – Line 3 display codes

Rate Damping
Load Damping

The Value in seconds of the displayed “Rate Damping”.

The Value in seconds of the displayed “Load Damping”.

Speed Damping

The Value in seconds of the displayed “Speed Damping”

3.3.4 Scale Data

Scale Capacity

The maximum rate of the integrator, entered by the user in the instrument setup. It is the reference value for the high and low rate set expressed in per cent.

Scale Division

Code of the Scale decimal places (Division) actually setted, according the table below:

SETTINGS	CODE
50	00H
20	01H
10	02H
5	03H
2	04H
1	05H
0,5	06H
0,2	07H
0,1	08H
0,05	09H
0,02	0AH
0,01	0BH
0,005	0CH
0,002	0DH
0,001	0EH

Tab 16- scale division codes

Scale model

The code number of Ramsey Scale used for internal calibration calculation.

Idler Space

The value in engineering units of the distance between the idlers across the scale.

The min and maximum limits for this one are :

UNITS	Feet	Meters	
		ITA	OTHER
MAX	120	25000	2500
MIN	2	50	50

Tab 17- Idler space limits

Angle

The value in engineering units of the Angle of Inclination of the Scale.

Load Cell Capacity

The value in engineering units of the Capacity of the load cell, as it appear on the label.

UNITS	Pounds	Kg
MAX	15000	5000
MIN	1	1

Tab 18- Load cell capacity limits

-
- Load Cell Sensitivity** The value in mV/V of the load cell Sensitivity.
 - Load Cell Resistance 1** The value in engineering units of the Input Resistance of the load cell N° 1
 - Load Cell Resistance 2** The value in engineering units of the Input Resistance of the load cell N° 2
 - Load Cell Resistance 3** The value in engineering units of the Input Resistance of the load cell N° 3
 - Load Cell Resistance 4** The value in engineering units of the Input Resistance of the load cell N° 4.
 - Load Cell Resistance 5** The value in engineering units of the Input Resistance of the load cell N° 5
 - Load Cell Resistance 6** The value in engineering units of the Input Resistance of the load cell N° 6
 - Speed Input** Code of the “Speed Sensor Input” selected according the table below:

SETTINGS	CODE
SINGLE	00H
SIMULATED	01H

Tab 19 – speed input code

Dead Band The value in percentage of the scale capacity (rate) in which the rate is ignored.

3.3.5 Calibration Data

Calibration Mode Code of the “Calibration mode” selected according the table below:

SETTINGS	CODE
R-CAL	00H
TEST CHAIN	01H
TEST WEIGHT	02H

Tab 20 – calibration code

- Calibration Resistance** The value of the resistor used for the “Calibration with Resistance”.
- Calibration Constant** The value of the constant for the resistance calculated by instrument.
- Chain Weight** The value in engineering units of the chain used as a sample weight for calibration.

UNITS	English	Metric
MAX	1000	3000
MIN	0	0

Tab 21- Chain weight limits

- Chain Constant** The value of the constant for the chain calculated by instrument.
- Test Weight** The value in engineering units of the sample weight used for calibration :

UNITS	English	Metric
MAX	LC CAP * LC NUMBER	LC CAP * LC NUMBER
MIN	0	0

Tab 22- Test weight limits

Weight Constant	The value of the constant for the sample weight calculated by instrument.
Calibration Interval	Number of selected days between two calibration.
RCal Factor	Number in percentage used to correct the “Calibration Constant” value to the real value.
Chain Factor	Number in percentage used to correct the “Chain Constant” value to the real value.
Weight Factor	Number in percentage used to correct the “Weight Constant” value to the real value.
Test Duration Length	The value in engineering units of one complete belt revolution.
Test Durat. Length Full	The value in engineering unit of the measured length of “one belt revolution” :

UNITS	Feet	Meters
MAX	10000	3000
MIN	1	0.5

Tab 23- Test duration length full limits

Test Durat. Length Partial	The value in engineering unit of the measured partial length of “belt”.
-----------------------------------	---

UNITS	Feet	Meters
MAX	10000	3000
MIN	1	0.5

Tab 24- Test duration length partial limits

Test Durat. Length Manual	The value in engineering unit of the measured length of “one belt revolution” :
----------------------------------	---

UNITS	Feet	Meters
MAX	10000	3000
MIN	1	0.5

Tab 25- Test duration length manual limits

Test Duration The value in engineering units of the last performed calibration.
Test Duration Time The value in second of the last performed calibration.
Azt opt. The enable option for AZT function.

SETTINGS	CODE
NO	00H
YES	01H

Tab 26 – Azt option limits

Azt Range The value in percentage of the Range of action of AutoZero tracking with reference to the scale capacity.
Azt Deviation The value in engineering units of the Maximum amount of zero error, that the AutoZero tracking can automatically compensate.
Speed Capacity The value in engineering units of the maximum speed capacity of the system.

UNITS	Feet	Meters
MAX	2000	10
MIN	1	0.1

Tab 27- Speed capacity limits

Calibration Number The value of Number of calibration defined
Protection Level Protection level of the instrument when password is enetred.

3.3.6 Diagnostic data

AD Gross Instantaneous value in engineering units of the AD counter converter (Gross).
AD Net Instantaneous value in engineering units of the AD counter converter (Net Only).
Weight Load Cell Instantaneous Value in mV of the load cell.
Zero Load Cell Value in engineering units of the AD converter equivalent to the Zero Calibration.
Span Load Cell Value in engineering units of the AD converter equivalent to the Span Calibration.
Prescaler Reduction factor for speed sensor count.
Test Duration Pulses N° of counted pulses during the material calibration.
Test Duration Length Length in meter equivalent to one or more belt revolution used for material calibration.
Service Password Numeric digit or a letter of the alphabet used by service people.The maximum length is 10 ascii characters:

VALID RANGE
a – z
A – Z
0 - 9

Tab 28- Service password limit

Operator Password

Numeric digit or a letter of the alphabet used by operator people. The maximum length is 10 ascii characters:

VALID RANGE
a – z
A – Z
0 - 9

Tab 29- Operator password limit

Software version

Release of the Instrument firmware's.

3.3.7 I/O Data

Analog Out Definition

Code of the setted "Out function" according the table below:

SETTINGSs	CODE
NONE	00H
RATE	01H
SPEED	02H
LOAD	03H

Tab 30 – analog out define code

Analog Out Range

Code of the setted "Range" according the table below:

SETTINGSs	CODE
0-20 mA	00H
4-20 mA	01H
20-0 mA	02H
20-4 mA	03H

Tab 31 – analog out range code

Analog Out Delay Length

The value in meter of the delay of the Analog Output.

UNITS	Feet	Meters
MAX	10000	300
MIN	0	0

Tab 32- Analog out delay length limits

Analog Out delay Time

The value in second of the delay of the Analog Output.

Analog Out Filter

The value in second that the output takes for the stabilization after a status variation.

Digital inputs assign

The digital inputs configuration.

INPUT ASSIGN NUMBERS	
MAX	2
MIN	0

Tab 33- Digital input assign numbers limits

Digital outputs assign

The digital oputputs configuration.

OUTPUT ASSIGN NUMBERS	
MAX	5
MIN	0

Tab 34- Digital output assign numbers limits

Totalizer Output Pulse

Frequency value (divisor) relevant the weight for which the output is activate.

Totalizer Output Durat.

The value in seconds of the duration of the pulse of the totalizer output's

Clip Detection Mode

Code of the setted "Clip Detection Mode" according the table below:

SETTINGS	CODE
MANUAL	00H
AUTO	01H

Tab 35 – Clip detect range code

Clip Detection Length

The value in meter, of the belt length, for which the calculation of Rate, must be kept freezed.

UNITS	Feet	Meters
MAX	10	3
MIN	0.5	0.1

Tab 36- Clip detect length limits

3.3.8 Alarms

Rate deviation opt. Enable the rate alarm condition.

SETTINGSs	CODE
NO	00H
YES	01H

Tab 37 – Rate dev. option limits

Low rate delay Delay time for low rate alarm condition.

Low rate set Set value for low rate alarm condition.

High rate delay Delay time for high rate alarm condition.

High rate set Set value for high rate alarm condition.

Load deviation opt. Enable the load alarm condition.

SETTINGSs	CODE
NO	00H
YES	01H

Tab 38– Load dev. option limits

Low load delay Delay time for low load alarm condition.

Low load set Set value for low load alarm condition.

High load delay Delay time for high load alarm condition.

High load set Set value for high load alarm condition.

Speed deviation opt. Enable the speed alarm condition.

SETTINGSs	CODE
NO	00H
YES	01H

Tab 39 – Speed dev. option limits

Low speed delay Delay time for low speed alarm condition.

Low speed set Set value for low speed alarm condition.

High speed delay Delay time for high speed alarm condition.

High speed set Set value for high speed alarm condition.

Alarm defines The user can select the desired mode between ALARM (just a warning message), SHUT DOWN (Warning message) and NONE (no action).

Code of the setted "Alarm define mode" according the table below:

SETTINGSs	CODE
AD_NONE	00H
AD_ALARM	01H
AD_SHUTDOWN	02H

Tab 40 – Alarm define code

3.3.9 Ethernet Settings

I.P. Address Represent the value of the I.P address of the device (default : 169.254.1.3).

SubNet Mask Represent the value of the Subnet Mask configured on the device (default : 255.255.255.000).

Variable Selection Code of mode on how the variable are transmitted according the table below:

SETTINGSs	WORD
NO DUMPED	00H
DUMPED	01H
DISPLAYED	02H

Tab 41– Variable selection range code

Swap integer data Mode to swap integer data in the communication protocols :

SETTINGSs	WORD
S_COM_SWAP_NONE	00H
S_COM_SWAP_BYTES	01H
S_COM_SWAP_WORD	02H
S_COM_SWAP_BYTES_WORD	03H

Tab 42– Variable selection range code

Swap float data Mode to swap float data in the communication protocols :

SETTINGSs	WORD
S_COM_SWAP_NONE	00H
S_COM_SWAP_BYTES	01H
S_COM_SWAP_WORD	02H
S_COM_SWAP_BYTES_WORD	03H

Tab 43– Variable selection range code

3.3.10 Profibus Settings

Address	Address of the device in the Profibus network.
Read Buffer Length	Size in N° of word the Reading Buffer.
Write Buffer Length	Size in N° of word the Writing Buffer.

3.3.11 Load Out (Batch)

Batch Option Enable the load out function.

SETTINGSs	CODE
NO	00H
YES	01H

Tab 44 – Batch option limits

Batch Preset The pre-set point for the current or the next load out. Defines when the rate will be lowered to increase batch accuracy.

CutOff Corr. The CutOff correction is the amount of material which flows on the belt scale after the batch end has been turned off. Select the method you want to use :

SETTINGSs	WORD
S_COFFNONE	00H
S_COFFADJ	01H
S_COFFAUTO	02H

Tab 45 – CutOff correction code

CutOff queue If the selection of the **CutOff Corr** is S_COFFNONE, the user can directly enter the CutOff queue.

CutOff len If the selection of the **CutOff Corr** is S_COFFAUTO , the user can enter the length of belt travel between the scale and the feeding point:

UNITS	Feet	Meters
MAX	300	100
MIN	0	0

Tab 46- CutOff len limits

CutOff dev If the selection of the **CutOff Corr** is S_ S_COFFADJ, the user must enter the maximum correction that the system is allowed to perform to the cut-off value.

Start Delay After the start command has been given, the system will wait the start delay entered here before activating the batch command.

Stabilization time After the batch command has been turned off at end of batch, the system will wait the coasting time entered here before freezing the batch total and print the batch data.

Batch deviation At end of batch, the system checks the error. If error is larger than the batch deviation ntered here, an alarm is generated.

4 QUERY, RESPONSE MESSAGES AND EXAMPLE

Below there are the structure of the data query from a Master (PLC) to the Slave (MINI CK 101)
Starting from the slave address field, the structure is that of the MODBUS message, except for error check field.

4.1 Read Operation Example (Function 03)

<u>QUERY</u>		<u>RESPONSE MESSAGE</u>	
Stamp	xxx	Stamp	xxx
Slave Address	xxx	Slave Address	xxx
Function	03H	Function	03H
Address. HI	xxx	Byte Count	xxx
Address. LO	xxx	Data MSB	xxx
N° Data HI	xxx	...	xxx
N° Data LO	xxx	Data LSB	xxx

EXAMPLE 1 – READ HOLDING REGISTER

The Host wants to receive the Linear Weight (belt Load) :

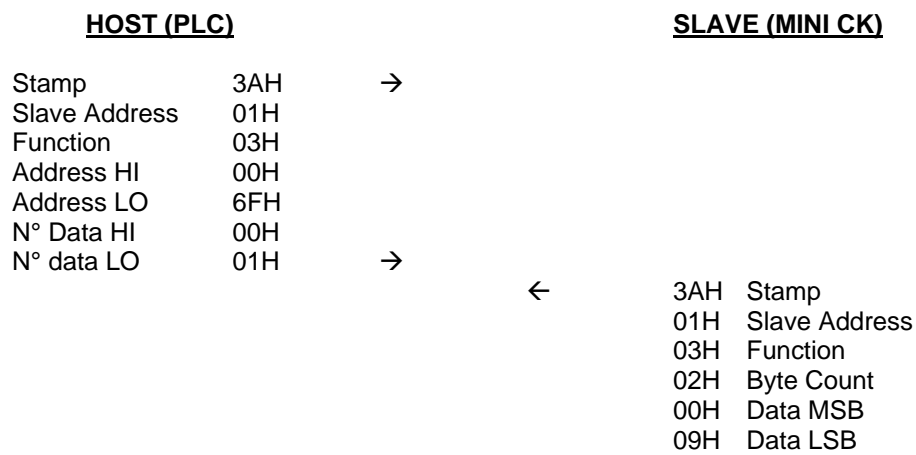
Address of slave : 01
Register N°: 59 (3B Hex)
Type of register: Float
Load value: 100,0 Kg/m

<u>HOST (PLC)</u>			<u>SLAVE (MINI CK)</u>	
Stamp	3AH			
Slave Address	01H			
Function	03H			
Address HI	00H			
Address LO	3BH			
N° Data HI	00H			
N° data LO	02H	→		
			←	
				3AH Stamp
				01H Slave Address
				03H Function
				04H Byte Count
				42H Data Hi
				C8H Data Lo
				00H Data Hi
				00H Data Lo

EXAMPLE 2 – READ HOLDING REGISTER

The Host wants to receive the Scale Division Settings :

Address of slave : 01
Register N°: 111 (6F Hex)
Type of register: integer
Division: 0,05



4.2 Write Operation Example

SINGLE REGISTER(1 Word)

<u>QUERY</u>		<u>RESPONSE MESSAGE</u>	
Stamp	xxx	Stamp	xxx
Slave Address	xxx	Slave Address	xxx
Function	06H	Function	06H
Address. HI	xxx	Address. HI	xxx
Address. LO	xxx	Address. LO	xxx
Preset Data HI	xxx	Preset Data HI	xxx
Preset Data LO	xxx	Preset Data LO	xxx

EXAMPLE 1

The Host wants to select (write) the language of the Instrument :

Address of slave : 01
Register N°: 100 (64 Hex)
Type of register: integer
Settings: French (03Hex)

<u>HOST (PLC)</u>			<u>SLAVE (MINI CK)</u>	
Stamp	3AH	→		
Slave Address	01H			
Function	06H			
Address HI	00H			
Address LO	64H			
Preset Data HI	00H			
Preset Data LO	03H	→		
			←	
				3AH Stamp
				01H Slave Address
				06H Function
				00H Address HI
				64H Address LO
				00H Preset Data HI
				03H Preset Data LO

MULTIPLE REGISTERS

<u>QUERY</u>		<u>RESPONSE MESSAGE</u>	
Stamp	xxx	Stamp	xxx
Slave Address	xxx	Slave Address	xxx
Function	10H	Function	10H
Start Address. HI	xxx	Start Address. HI	xxx
Start Address. LO	xxx	Start Address. LO	xxx
N° of Registers HI	xxx	N° of Registers HI	xxx
N° of Registers LO	xxx	N° of Registers LO	xxx
Byte Count	xxx		
Data Hi	xxx		
Data Lo	xxx		
Data Hi	xxx		
Data Lo	xxx		

EXAMPLE 1

The Host wants to write the scale capacity of the Instrument :

Address of slave : 01
Register N°: 109 (6D Hex)
Type of register: float
Settings: 100.0 Kg

<u>HOST (PLC)</u>			<u>SLAVE (MINI CK)</u>	
Stamp	3AH	→		
Slave Address	01H			
Function	10H			
Start Address. HI	00H			
Start Address. LO	06D			
N° of Registers HI	00H			
N° of Registers LO	02H			
Byte Count	04H			
Data Hi	00H			
Data Lo	00H			
Data Hi	42H			
Data Lo	C8H	→	←	
				3AH Stamp
				01H Slave Address
				10H Function
				00H Start Address HI
				6DH Start Address LO
				00H N° Data HI
				02H N° Data LO

APPENDIX A

FLOATING POINT NOTATION

MINI CK 101 stores floating point data types using the IEEE single precision format. The format contains a sign bit, an exponent field and a fraction field or mantissa.

- The represented value

the value of the number being represented is equal to the exponent multiplied by the fractional part with the sign specified by the bit sign field:

$$(-1)^{\text{sign}} * (1.0 + \text{fraction}) * s^{(\text{exp} - \text{bias})}$$

For detailed information, refer to the *ANSI IEEE Standard for Binary Floating Point Arithmetic*.

- Sign Bit

The sign of the number being represented is stored in the sign bit. If the number is positive, the sign bit contains the value 0. If it is negative, it contains the value 1. The sign bit is stored in the most significant bit of a floating point value.

- Exponent Field

Using an exponent increases the range of representable numbers. The exponent field of the number contains a 'biased' form of the exponent. A bias is subtracted from the exponent field, letting the actual exponent represent both positive and negative exponents. The value of this bias is hexadecimal 7F therefore the effective exponent (Rexp) of the number can be obtained as:

$$\text{Rexp} = \text{Exp} - 7\text{F}$$

Note

If both the exponent field and the fraction field are equal to zero, the number being represented is zero.

- Fraction field (Mantissa)

IEEE floating point format stores the fractional part of a number in a "normalized" form. It assumes that all nonzero numbers are of the following form:

$$1.\text{xxxxxxxx (binary)}$$

The character x represent either 0 or 1 (binary).

Since all floating point numbers being with 1, the 1 becomes the implicit normalized bit. It is the most significant bit of the fraction and is not stored in memory. The binary point is located immediately to the right of the normalized bit. All bits after the binary point represent values less the 1 (binary).

Example:

The number 1.625 (dec) can be represented as:

APPENDIX B

INSTRUMENT CONFIGURATION: THE “GSD” FILE

Profibus devices have different performances characteristics. Features differ in regards to available functionality or possible bus parameters such as baud rate and time monitoring. These parameters vary individually for each device type and vendor. For this reason the PROFIBUS Organization has standardized a database file, it contains all the characteristics of the PROFIBUS device and must be delivered by the vendor together with the device. This file has a name that depends by the vendor and an extension that is normally GSD but can be different depending by the country of origin of the device. The third letter of the extension in fact defines the country:

D	-	Default, is valid for each country
I	-	Italian
G	-	German
E	-	English
F	-	French
P	-	Portuguese
S	-	Spanish

Refers to the manual of the device you are using as Master of your PROFIBUS network to get information about how to use the GSD file.

These are the main PROFIBUS characteristics of the Ramsey MINI CK 101 instruments.

Vendor	Ramsey
Model	MINICK101
Ident number	0x2101
Protocol	Standard DP
Baud rate supported	from 9.6 kb to 12 Mb
Freeze Mode supp	NO
Sync Mode supp	NO
Auto Baud supp	YES
Set Slave Add_supp	NO
Station Type	Compact
Prm Data Length	7
Diag Data Length	8
Config Data Length	9
Input data length (write buffer)	5-48 word, coherency over word
Output data length (read buffer)	5-48 word, coherency over word

To change I/O data length

The instrument gives the possibility to define the write and read buffer dimensions. Default values are 48 words for both, if the user changes them he should also modify the GSD file so that the configuration in the instrument setup and in the file corresponds.

To make it is easy. The GSD file should be edited with a normal text editor and the value at the directive 'module =' at the bottom of the file should be changed. It normally appears as follows:

```
Module = "MINICK101" 0xC0,0x6F,0x6F
```

The first value (0xC0) should be left unchanged, the second value specifies the dimension of the write buffer, the third of the read buffer.

The value to set should be computed as follows:

```
Read_Buffer_Dim = 63 + RBD  
Write_Buffer_Dim = 63 + WBD
```

where:

RBD is the read buffer dimension defined in the instrument setup.
WBD is the write buffer dimension defined in the instrument setup.

The value should be then converted and written in hexadecimal notation.

The meaning of the default values 0x6F is:

```
6F hex = 111 dec = 63 + 48
```

48 is the default dimension of the buffers.

Instruction are also contained in the GSD file.

Follows the contents of the Ramsey MINICK101 GSD file.

R_MINICK101.GSD :

```
#Profibus_DP
GSD_Revision      = 1
;
Vendor_Name       = "Ramsey"
Model_Name        = "MINICK101"
Revision          = "Rev.A"
Ident_Number      = 0x2105
Protocol_Ident    = 0
Station_Type      = 0
FMS_supp          = 0
Hardware_Release  = "Rev.A"
Software_Release  = "86.GSD.01"
;
9.6_supp          = 1
19.2_supp         = 1
93.75_supp        = 1
187.5_supp        = 1
500_supp          = 1
1.5M_supp         = 1
3M_supp           = 1
6M_supp           = 1
12M_supp          = 1
;
MaxTcdr_9.6       = 60
MaxTcdr_19.2      = 60
MaxTcdr_93.75     = 60
MaxTcdr_187.5     = 60
MaxTcdr_500       = 100
MaxTcdr_1.5M      = 150
MaxTcdr_3M        = 250
MaxTcdr_6M        = 450
MaxTcdr_12M       = 800
;
Redundancy        = 0
Repeater_Ctrl_Sig = 0
24V_Pins          = 0
Implementation_Type = "ifak"
Bitmap_Device     = "dev.dib"
Bitmap_Diag       = "diag.dib"
Bitmap_SF         = "sf.dib"
;
Freeze_Mode_supp  = 0
Sync_Mode_supp    = 0
Auto_Baud_supp    = 1
Set_Slave_Add_supp = 0
Min_Slave_Intervall = 12
;
```

```

Modular_Station      = 0
Modul_Offset        = 1
Max_User_Prm_Data_Len= 7
;
Fail_Safe           = 0
Slave_Family        = 5
Max_Diag_Data_Len   = 8
;
Unit_Diag_Bit(0)    = "Coherency Error"
Unit_Diag_Bit(1)    = "Limits Error"
Unit_Diag_Bit(2)    = "Register Number Error"
Unit_Diag_Bit(3)    = "Group ID Error"
;
;-----
;
;
; Buffers dimension
;
; Standard buffer dimension is :      48 words read buffer (0x6F)
;                                     48 words write buffer (0x6F)
;
; Dimensions can be changed by modifying the last two value in the
; 'Module' definition below.
; The value should be obtained as follows:
;
;      63 + WB_WN    or    63 + RB_WN
;
; where WB_WN is the wished words number for the write buffer, RB_WN is
; the wished words number for the read buffer.;
; The value should be converted in hexadecimal format. Default value
; hex 6F corresponds to:
;
;      63 + 48  ->  111 dec ->  6F hex
;
; WB_WN and RB_WN values must be entered also in the instrument setup
; in decimal format.
;
;      Write buffer ----+  +---- Read buffer
;                      |  |
;                      V  V
;
Module = "MT2000" 0xC0,0x6F,0x6F
1
EndModule
;

```