

RAMSEY

by  **SRO TECHNOLOGY**



**Micro-tech 9000
Profibus-DP Protocol
Manual**

**REC 4372 Rev D
English**

Revision History

Revision	Date Released	Details of the Release
Rev A	December 2013	First release of the newly created Micro-Tech 9000 Profibus-DP Protocol Manual
Rev B	March 2014	Adding 9105 data tables.
Rev C	July 2014	Adding 9105 data tables. Corrections.
Rev D	May 2026	Rebranding Ramsey by SRO Technology

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Introduction

About this Manual

This manual informs you how to set up and operate your Micro-Tech 9000 using the Profibus communication protocol.

Conventions

The following conventions are used in this manual.

- The names of Micro-Tech buttons, functions, and so on are shown using initial upper-case letters—for example, Menu, Run, Edit, Choice, TPH (standard U.S. tons per hour), and so forth.
- Italics are used in the text for emphasis.

NOTE. Provides information of special importance.

HINT. Indicates a hint about understanding or operating Micro-Tech.

Safety Precautions

Listed below are the safety messages for your Micro-Tech and its associated scale system. Please read all safety messages *very carefully*, because this information is important—for your own personal safety and the safety of others.



WARNING. Failure to observe could result in death or serious injury.



CAUTION. Failure to observe may cause minor injury or damage to the equipment.

Product Overview

Overview

The PROFIBUS is one of the main standardized communication systems. All its characteristics, rules and technical information are defined in the PROFIBUS DIN normative.

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

The Micro-Tech variation is PROFIBUS-DP.

Profibus DP

Profibus-DP is the performance-optimized version specifically dedicated to time-critical communication between automation systems and distributed peripherals. It is typically used to transfer I/O images between a main PLC and remote devices (sensors, actuators, transmitters, etc.). In this case, it will be used to transfer (read and write) blocks of data.

Profibus is a typical master/slave communication where the main PLC is the master or scanner, and the Micro-Tech device is a slave. The connection is EIA RS 485 through a 2-wire twinax cable.

Data Transfer

The interface between the master and slaves is structured in parameterization, configuration, and data transfer phase. In the parameterization 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 length of information have to be identical. This guarantees protection against a configuration fault. Maximum number of data that is possible to transfer in this phase at one time is limited to 246 bytes (123 words). 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.

Installation

The PROFIBUS-DP interface board (Optional) is a plug-in board that can be installed in one of the motherboard expansion slots J10-J13 and that handles the interface between the Micro-Tech (slave) and the master.

No hardware configuration jumpers or switches are present on the PROFIBUS-DP board.

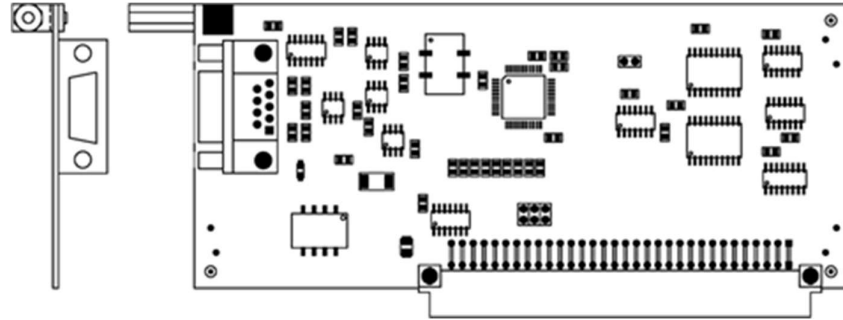


Figure 1 Profibus-DP Interface Board

Wiring

Different types of cables are available on the market when assembling PROFIBUS networks.

Standard Siemens PROFIBUS LAN cable number 6XV1 830-0AH10 is recommended. Consult the Siemens PROFIBUS network manual for additional information relevant to wiring and available auxiliary devices (like a repeater).

The table below indicates the maximum cable segment length admitted according to the communication speed.

Table 1 Maximum Cable Length of a Segment

Transmission Rate	Maximum Cable Length of a Segment (in mt.)
9.6 to 93.75 Kbps	1000
187.50 Kbps	800
500.00 Kbps	400
1.50 Mbps	200
3.0 to 12.00 Mbps	100

Bus Connector

The bus connector should be rated for the max allowed speed of the Profibus (12 Mb) and should contain a termination resistor that can be switched on or off.

The table below shows the pin-out of the 9 pin Sub-D us connector.

Table 2 Bus Connector

Pin	Signal	Cable
1	Chassis Ground	Shield
2	Not Used	-
3	RxD/TxD – Data Line B	RED wire
4	Not Used	-
5	Data Ground	-
6	+5VDC (100mA Max)	-
7	Not Used	-
8	RxD/TxD – Data Line A	GREEN wire
9	Not Used	-

Connect the green and red cable wires to the screw terminal block located in the connector and ensure that the shield is making metal to metal contact with the connector guide. The two pairs of terminals for signal wires A and B are identical.

NOTE. The same wires (green or red) must always be connected to the same terminal A or B in all bus terminals and with all bus connections and be uniform throughout the segment.

Set-Up

After installing the board in one of the free slots (please see the Reference Manual of the Micro-Tech for details) the following screen appears:

READY	BATCH	ALARM	CALIB
- SLOT #n CHANGED - Acquire new Configuration?			
YES	NO		

If the question is not answered, the screen disappears after ten seconds, and the Micro-Tech assumes the answer is NO. HW (hardware) alarm is on and cannot be reset. The screen will appear each time power is cycled if the question is not answered.

Answer YES because this is a hardware configuration change. Set-up data must now be entered.

Slave Address

Through the new PROFIB menu, which can be found on Main Menu 5, it is possible to assign the slave address:

READY	BATCH	ALARM	CALIB
- PROFIBUS SCROLL 1 -			
Address <u>1</u>			
EDIT			

The limits of values that can be set are the following: Default: 1
 Min: 1
 Max: 126
 (Password: Service.)

Buffer Dimension

In the next two scrolls, the operator can define independently the read and write buffer dimensions.

READY	BATCH	ALARM	CALIB
- PROFIBUS SCROLL 2 -			
Read Buffer dim.			
<u>48</u>			
EDIT			

The limits of values that can be set are the following:
 Default: 48
 Min: 5
 Max: 48
 (Password: Service.)

Variable Selection

The operator can define how to receive the data from the Micro-Tech. Raw (not damped), damped, or in the same way that the data is displayed:

READY	BATCH	ALARM	CALIB
- PROFIBUS SCROLL 4 -			
Variable selection			
>not damped<			
CHOICE			

Default: not damped
 Selection: not damped, damped, displayed

Communication

The PROFIBUS interface allows a remote intelligent device to read and write data from and to the Micro-Tech. During the communication activity, the Micro-Tech will always act as a slave, meaning it will respond to a request from a master device on the line, but will never attempt to send messages out.

Timings

The Micro-Tech updates almost all its basic variables (e.g., load, weight, rate, totals) every 100 milliseconds. With the same frequency Micro-Tech updates the read buffer. If the master performs more communications in this period, it will receive the same data more times.

The write request is interpreted by Micro-Tech in polling with a period of 100 milliseconds.

Error Management

Errors in communication are managed in the Micro-Tech. A specific alarm is generated whenever one or both of the following conditions become true:

- The SPC3 controller installed on the PROFIBUS board does not recognize successful data transfer within the watch dog control interval.
- The received data contains errors (value overlaps limits, register number does not exist, group number does not exist); in this case the Micro-Tech activates an Expanded Diagnostics request to the master. Details of this diagnostic can be found in the DIAGNOSTIC DATA paragraph.

Details on how to define and manage the generated alarm can be found in the Reference Manual of the instrument.

Data Definitions

The following table gives information about some characteristics of the data that are available from/to the Micro-Tech.

Table 3 Data Definitions

Term	Definition
Register	Conventional name assigned to the Data.
Format	The register format can be one of the following. <ul style="list-style-type: none"> • Char: an ASCII string • Integer: 16 bits IEEE integer (1 word) • Long: 32 bits IEEE long integer (2 word) • Float: 32 bits IEEE float (2 word) • Double: 64 bits IEEE double precision float (4 word)
Type	The register type can be one of the following. <ul style="list-style-type: none"> • RO: The register can be read but cannot be written. • WO: The register can only be written. • RW: The register can be read or written. Write is allowed if the instrument is in the specified protection level at the moment the write message is received.

Data Organization

Data are organized in registers collected in several block, some of them are “Read only” (RO) while others are “Write Only” (WO) block.

Blocks are identified by a number as below:

Table 4 9101 Data Organization

Block Type	Identification Number	Description of Data	Reference Page
Read	0	Status, Alarms, I/O, Dynamic data	-
	1	Batch (Load Out)	-
	2	Sets and Thresholds	-
Write	100	Commands	-
	101	Batch (Load Out)	-
	102	Sets and Thresholds	-

Table 5 9100 Data Organization

Block Type	Identification Number	Description of Data	Reference Page
Read	0	Status, Alarms, I/O, Dynamic data	-
	1	Sets and Thresholds	-
Write	100	Commands	-
	101	Sets and Thresholds	-

Table 6 9104 Data Organization

Block Type	Identification Number	Description of Data	Reference Page
Read	0	Status, Alarms, I/O, Dynamic data	-
	1	Batch (Load Out)	-
	2	Sets and Thresholds	-
Write	100	Commands	-
	101	Batch (Load Out)	-
	102	Sets and Thresholds	-

Table 7 9105 Data Organization

Block Type	Identification Number	Description of Data	Reference Page
Read	0	Status, Alarms, I/O, Dynamic data	-
	1	Batch (Load Out)	-
	2	Sets and Thresholds	-
Write	100	Commands	-
	101	Batch (Load Out)	-
	102	Sets and Thresholds	-

Table 8 9106 Data Organization

Block Type	Identification Number	Description of Data	Reference Page
Read	0	Status, Alarms, I/O, Dynamic data	-
	1	Batch (Load Out)	-
	2	Sets and Thresholds	-
Write	100	Commands	-
	101	Batch (Load Out)	-
	102	Sets and Thresholds	-

Table 9 9109 Data Organization

Block Type	Identification Number	Description of Data	Reference Page
Read	0	Status, Alarms, I/O, Dynamic data	-
	1	Batch (Load Out)	-
	2	Sets and Thresholds	-
Write	100	Commands	-
	101	Batch (Load Out)	-
	102	Sets and Thresholds	-

Read Operations

In the PROFIBUS protocol, the master continuously reads data from the slave. Since the Micro-Tech has a large number of registers that can be sent to the master, as previously said, registers are collected in blocks.

Therefore, the master should have the possibility to tell the Micro-

Tech which block and which register of the block it needs to read. This is performed by a write operation as described in the next chapter.

After the Micro-Tech receives and interprets this write request, it starts to fill the read buffer with the requested data.

The Micro-Tech 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 receives after a read operation is a buffer of data having the following structure:

Table 10 Read Buffer

ID	Register	Data Type	Offset	Remark
1	Block Identifier	Integer	1	Identification Number of Block Type (0,1,2,3)
2	1 st Register	Integer	2	Number of the first register within the block
3	N° of Registers	Integer	3	Numbers of registers to read within the block
4	Stamp	Integer	4	See explanation below
5	Data #1	May vary	5	Value of the first register
....	
n	Data #n	May vary	Value of the last register

HEADER

}

DATA

}

After power on, the Micro-Tech starts to update the read buffer with the register of the read block 0 (scale 1).

Write Operations

The write operation simply consists in sending to the Micro-Tech the values to write in the registers together with indications to identify what registers have to be written. The write telegram is composed of two parts, Header and Data.

Table 11 Write Package

ID	Register	Data Type	Offset	Description
1	Block Identifier	Integer	1	See #1
2	1 st Register	Integer	2	See #2
3	N° of Registers	Integer	3	See #3
4	Stamp	Integer	4	See #4
5	Data #1	May vary	5	Value of the first register
....	
n	Data #n	May vary	Value of the last register

HEADER

}

DATA

}

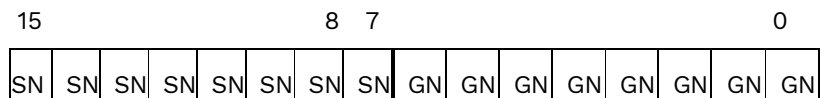
Header

#1 –BLOCK IDENTIFIER

This register identifies which block of data the master wants to write.

The Micro-Tech can also handle two or more independent scales, so it keeps in memory more copies for each group. The block identifier register is also used to determine which scale the data refers to.

- The first byte (MSB) is used to identify the scale number.
- The second byte (LSB) identifies the block number according to the description of Data Organization Table.



GN = Block Number e.g. See Table 4

SN = Scale number:

- 00 □ Scale 1
- 01 □ Scale 2
- 02 □ Scale 3
- 04 □ Scale 4

Example:

258 (hex0102) = Scale 2, Block 2 □ Read “Set and Thresholds” of Scale 2

101 (hex0065) = Scale 1, Block 101 □ Write “Batch” data of Scale 1,

#2 –FIRST REGISTER NUMBER

Registers in the groups are numbered from 0 to n, and the master has the possibility to write only a portion of the registers composing the group.

This parameter specifies the first register to write; 0 means the first register of the group.

#3 –NUMBER OF REGISTERS

This parameter specifies the number of registers to write.

#4 –STAMP

In the PROFIBUS protocol, data is transmitted continuously, so the same telegram is sent by the master to the slave several times. To avoid the slave interpreting the same data continuously (it would create problems; for example, with the commands), the element called “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 creates a new telegram.

The stamp of the last interpreted telegram is re-transmitted by the Micro-Tech in the read buffer.

The Data section contains the data to write in the order MSB – LSB (Most Significant Bit – Least Significant Bit).

When the Micro-Tech processes the package, before writing the received data in the registers, it checks that all the parameters are correct (example: Block identifiers refer to an existing block).

Data

The data to write does not overlap specified maximum and minimum limits (each writeable register has its own maximum and minimum limit according to the Write Block tables, e.g. See **Table 16, Table 17, & Table 18**); If it detects errors, the write operation fails and a DIAGNOSTICS message will be activated.

REMARK: In a write operation, if the block identifier refers to a read block (0,1,2,3) only the header of the telegram is interpreted. The data are ignored.

Diagnostic Data

The master system has the possibility to detect a communication error condition by checking the diagnostics. In case of an error, the Micro-Tech will activate the request for diagnostic acquisition, indicating the expanded device related diagnostics data is present.

When the master requires the diagnostics, it receives:

Table 12 Composition of the Diagnostics Data

Byte	Bit Position								Diagnostic Data
	7	6	5	4	3	2	1	0	
0									StatStatus1
1									StatStatus2
2									StatStatus3
3									Master Add
4									Ident NumberHigh
5									Ident NumberLow
6	0	0	0	0	0	0	1	0	Ext Diag - Header
7	0	0	0	0	GE	RE	LE	CE	Ext Diag - Data

GE Group Error: Invalid group identifier, the group does not exist.
RE Register number Error: The number of requested register 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).

The individual bits in **Table 12** have the following meaning:

Bit 7: *Diag.Master_Lock*

The DP-Slave has been parameterized from another master. This bit is set by the DP-Master (class 1), if the address in octet 4 is different from 255 and different from the own address. The DP-Slave sets this bit to zero.

Bit 6: *Diag.Prm_Fault*

This bit is set by the DP-Slave if the last parameter frame was faulty (e.g., wrong length, wrong Ident_Number, invalid parameters).

Bit 5: *Diag.Invalid_Slave_Response*

This bit is set by the DP-Master as soon as receiving a not plausible response from an addressed DP-Slave. The DP-Slave sets this bit to zero.

Bit 4: *Diag.Not_Supported*

This bit is set by the DP-Slave as soon as a function is requested, which is not supported from this DP-Slave.

Bit 3: *Diag.Ext_Diag*

This bit is set by the DP-Slave. It indicates a diagnostic entry exists in the slave specific diagnostic area (*Ext_Diag_Data*) if the bit is set to one. If the bit is set to zero, a status message can exist in the slave specific diagnostic area (*Ext_Diag_Data*). The meaning of this status message depends on the application and will not be fixed in this standard.

Bit 2: *Diag.Cfg_Fault*

This bit is set by the DP-Slave as soon as the last received configuration data from the DP-Master are different from these which the DP-Slave has determined.

Bit 1: *Diag.Station_Not_Ready*

This bit is set by the DP-Slave if the DP-Slave is not yet ready for data transfer.

Bit 0: *Diag.Station_Non_Existent*

This bit is set by the DP-Master if the respective DP-Slave cannot be reached over the line. If this bit is set, the diagnostic bits contain the state of the last diagnostic message or the initial value. The DP-Slave sets this bit to zero.

9101 Software Version: 140.00.02.12

9101 - Registers Description

This section lists and describes in detail all available Registers for the Micro-Tech.

9101 – Block 0

Block “0” is the Read block that contains all the registers relevant to the Status, Alarms, I/O and Dynamic data. It is the default group the Micro-Tech sends to the master for a read request if the master does not change request.

Table 13 9101 Read Block 0: Status, Alarm, I/O, Dynamic data.

Register Name	Format	Offset	Description
Status (1)	Integer	5	General Status - See “Table Status (1)”
Status (2)	Integer	6	Batch (Load out) Status - See “Table Status (2)”
Status (3)	Integer	7	Not Used
Status (4)	Integer	8	Not Used
Alarm (1)	Integer	9	See “Table Alarm (1)”
Alarm (2)	Integer	10	See “Table Alarm (2)”
Alarm (3)	Integer	11	See “Table Alarm (3)”
Alarm (4)	Integer	12	See “Table Alarm (4)”
Alarm (5)	Integer	13	See “Table Alarm (5)”
I/O Image (1)	Integer	14	See “Table I/O (1)”
I/O Image (2)	Integer	15	See “Table I/O (2)”
I/O Image (3)	Integer	16	See “Table I/O (3)”
Rate	Float	17	Instantaneous rate in engineering units as currently displayed.
Belt Load	Float	19	Instantaneous belt load in engineering units.
Belt Speed	Float	21	Instantaneous belt speed in engineering units.
Master Total	Float	23	Current value of the “Master Total” totalizer.
Reset Total	Float	25	Current value of the “Reset Total” totalizer. Reset total can be zeroed by setting a bit in the commands register.
Operator Total	Float	27	Current value of the “Operator Total” totalizer. Operator total can be zeroed by setting a bit in the commands register.
Calibration Error	Float	29	Error in percent resulting from a remote calibration. The master can evaluate it before accepting the result of a remote “autozero” or “autospan”.

9101 - Block 1

Block “1” is the *Read block* that contains all the registers relevant to the *Batch (Load out)* function.

Table 14 9101 READ BLOCK 1: Batch (Load out) Function.

Register Name	Format	Offset Word	Description
Batch Number	Integer	5	Number of the currently running load out or number of the last finished one. The Micro-Tech will automatically increment the batch number when a new batch is started.
Batch Deviation	Integer	6	Maximum acceptable deviation from the batch set point. Usually entered by the operator.
Batch Total	Float	7	Current contents of the “Batch (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.
Batch Set	Float	9	The “Set point” for the current or the next batch (load out). Usually entered or downloaded by the operator; the value is updated only when a batch is started.
Batch Preset	Float	11	The “Preset point” for the current or the next batch (load out). Defines when the rate will be lowered to increase batch accuracy.
Batch Preact	Float	13	Value of the Set point of the “Preact” for the current or the next batch. Entered or downloaded by the operator (if in MANUAL mode) or calculated by the Micro-Tech, defines when the load out has to stop to compensate the queue of material from the loading point to the scale.

9101 - Block 2

Block “2” is the *Read block* that contains all the registers relevant to Sets and Thresholds.

Table 15 9101 READ BLOCK 2: Sets and Thresholds

Register Name	Format	Offset Word	Description
Scale Capacity	Float	5	Maximum flow rate of the scale. Entered by the operator in the Micro-Tech setup, is the reference value for the high and low rate set points expressed in percent.
Belt Load Capacity	Float	7	Maximum belt load of the instrument. This value is not defined in the Micro-Tech setup, but it is internally computed and is the reference value for the high and low belt load set points expressed in percent.
Belt Speed Capacity	Float	9	Maximum speed of the conveyor belt. It is the reference value for the high and low speed set points expressed in percent.
High Rate Set	Float	11	Actual “High Rate” alarm value in percent of the Scale Capacity value.
Low Rate set	Float	13	Actual “Low Rate” alarm value in percent of the Scale Capacity value.

High Load Set	Float	15	Actual “High Weight” alarm value in percent of the Belt Load Capacity value.
Low Load Set	Float	17	Actual “Low Weight” alarm value in percent of the Belt Load Capacity value.

Register Name	Format	Offset Word	Description
High Speed Set	Float	19	Actual “High Speed” alarm value in percent of the Belt Speed Capacity value.
Low Speed Set	Float	21	Actual “Low Speed” alarm value in percent of the Belt Speed Capacity value.

9101 - Block 100

Block “100” is the Write block that is used to drive (set-reset) outputs as well as to send Commands to the Micro-Tech.Block.

Table 16 9101 WRITE BLOCK 100: Commands

Register Name	Format	Offset Word	Limit Low	Limit High	Description
Commands High	Integer	5	0	65535	See “Table Command High”
Set/Res Out #	Integer	6	0	Installed Output Number	It is a variable that allows the master to directly handle the spare digital outputs of the Micro-Tech. There are 5 registers in the write group so the master has the capability to Set or Reset up to a maximum of five outputs simultaneously. The least significant byte of the word is used to select the number of the physical output. The most significant byte is used to set/reset the output; set the first bit to 1 for “ON”, and to 0 for “OFF”. If the content of this byte is 0, the command is ignored. WARNING: The Micro-Tech does not control if the output the master is setting/resetting is a spare or not; if the master tries to change the state of a not-spare output, a conflict could happen.
Set/Res Out #	Integer	7	0		
Set/Res Out #	Integer	8	0		
Set/Res Out #	Integer	9	0		
Set/Res Out #	Integer	10	0		

9101 - Block 101

Block “101” is the Write block used to manage the registers relevant to the Batch (Load out) function.

Table 17 9101 WRITE BLOCK 101: Batch (Load out)

Register Name	Format	Offset Word	Limit Low	Limit High	Description
Batch Number	Integer	5	0	999	-
Batch Deviation	Integer	6	0	100.0	
Batch Set	Float	7	0	10000.0	
Batch Preset	Float	9	0	10000.0	-
Batch Preact	Float	11	0	10000.0	The set point of the preact for the current or the next load out. Entered or downloaded by the operator (if in MANUAL mode) or calculated by the Micro-Tech. Defines when the load out has to stop to compensate the queue of material from the loading point to the scale

9101 - Block 102

Block “102” is the Write block used to manage the registers relevant to Sets and Thresholds.

Table 18 9101 WRITE BLOCK 102: Sets and Thresholds

Register Name	Format	Offset Word	Limit Low	Limit High	Description
High Rate Set	Float	5	0	150.0%	The set point for High Rate alarm in percent of the Scale Capacity value
Low Rate set	Float	7	0	105.0%	The set point for Low Rate alarm in percent of the Scale Capacity value
High Load Set	Float	9	0	200.0%	The set point for High weight alarm in percent of the Belt Load Capacity value
Low Load Set	Float	11	0	105.0%	The set point for Low weight alarm in percent of the Belt Load Capacity value
High Speed Set	Float	13	0	150.0%	The set point for High Speed in percent of the Belt Speed Capacity value.
Low Speed Set	Float	15	0	105.0%	The set point for Low Speed in percent of the Belt Speed Capacity value.

9101 - Details of Blocks

This section gives detailed information about each of the registers (such as the status, alarm, I/O) listed in the Read Block tables above.

9101 - Read Block 0: Status (1)

Bit	Description
15	Cumulative Shutdown (a shutdown alarm is pending)
14	Cumulative Alarms (an alarm is pending)
13	Calibration Running
12	Not Used
11	Calibration (Led)
10	Alarm (Led)
09	Batch (Led)
08	Ready (Led)
07	High Load (Load is higher than limit)
06	Low Load (Load is lower than limit)
05	High Rate (Rate is higher than limit)
04	Low Rate (Rate is lower than limit)
03	High Speed (Speed is higher than limit)
02	Low Speed (Speed is lower than limit)
01	Not Used
00	Not Used

**9101 - Read
Block 0: Status
(2)**

Bit	Description
15	Not Used
14	Not Used
13	Not Used
12	Not Used
11	Not Used
10	Not Used
09	Not Used
08	Not Used
07	Not Used
06	Not Used
05	Batch Phase bit 3
04	Batch Phase bit 2
03	Batch Phase bit 1
02	Batch Phase bit 0
01	Not Used
00	Not Used

Batch phase

Only applicable if Batch Enabled:

Bits	3	2	1	0		
	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 coasting time
	1		x	x	x	Batch suspended

9101- Read Block 0: Alarm (1)

Each bit represents the status of an alarm. If the alarm is active, the relevant bit contains a one (1), otherwise it contains a zero (0).

Bit	Description
15	Clock Fail
14	CELL FAIL (<i>if Single Scale</i>)
13	Cell Fail 1 - (Scale 1/Channel 1)
12	Cell Fail 2 - (Scale 1/Channel 2 or Scale 2/Channel 1)
11	Cell Fail 3 - (Channel 3)
10	Cell Fail 4 - (Channel 4)
09	Not Used
08	Not Used
07	Speed Sensor Error
06	HIGH LOAD (<i>if Single Scale</i>)
05	High Load Scale # 1
04	High Load Scale # 2
03	LOW LOAD (<i>if Single Scale</i>)
02	Low Load Scale # 1
01	Low Load Scale # 2
00	HIGH RATE (<i>if Single Scale</i>)

9101 – Read Block 0: Alarm(2)

Bit	Description
15	High Rate Scale # 1
14	High Rate Scale # 2
13	LOW RATE (<i>if Single Scale</i>)
12	Low Rate Scale # 1
11	Low Rate Scale # 2
10	HIGH SPEED (<i>if Single Scale</i>)
09	High Speed Scale # 1
08	High Speed Scale # 2
07	LOW SPEED (<i>if Single Scale</i>)
06	Low Speed Scale #1
05	Low Speed Scale #2
04	Warm Start
03	Cold Start
02	Power During Calibration
01	CALIBRATION TIME ELAPSED (<i>if Single Scale</i>)
00	Calibration Time Elapsed Scale # 1

**9101 – Read Block 0: Alarm
(3)**

Bit	Description
15	Calibration Time Elapsed Scale # 2
14	External Alarm 1
13	External Alarm 2
12	External Alarm 3
11	OVERFLOW TOTALIZER <i>(if Single Scale)</i>
10	Overflow Totalizer Scale #1
09	Overflow Totalizer Scale #2
08	AZT OVER LIMIT <i>(if Single Scale)</i>
07	AZT Over Limit Scale #1
06	AZT Over Limit Scale #2
05	BATCH DEVIATION <i>(if Single Scale)</i>
04	Batch Deviation Scale #1
03	Batch Deviation Scale #2
02	HW configuration Changed Slot 1
01	HW configuration Changed Slot 2
00	HW configuration Changed Slot 3

**9101 – Read Block 0: Alarm
(4)**

Bit	Description
15	HW configuration Changed Slot 4
14	Not Used
13	Not Used
12	Not Used
11	Math Error
10	Printer Error
09	Communication Error
08	Not Used
07	Profibus Error
06	ZERO LIMIT <i>(if Single Scale)</i>
05	Zero Limit Scale #1
04	Zero Limit Scale #2
03	AZT OVER LIMIT STEP <i>(if Single Scale)</i>
02	AZT Over Limit Step Scale #1
01	AZT Over Limit Step Scale #2
00	Multiple load cell imbalance alarm

**9101 - Read
Block 0: Alarm (5)**

Bit	Description
15	A/D Shutdown
14	A/D Shutdown Channel 1
13	A/D Shutdown Channel 2
12	A/D Shutdown Channel 3
11	A/D Shutdown Channel 4
10	Not Used
09	Not Used
08	Not Used
07	Not Used
06	Not Used
05	Not Used
04	Not Used
03	Not Used
02	Not Used
01	Not Used
00	Not Used

9101 – Read Block 0: I/O (1)

Bit	Description
15	Not Used
14	Not Used
13	Not Used
12	Input 5 - Digital Input Board
11	Input 4 - Digital Input Board
10	Input 3 - Digital Input Board
09	Input 2 - Digital Input Motherboard (Speed Input 2)
08	Input 1 - Digital Input Motherboard (Speed Input 1)
07	Input 8 – Optional Digital 8In/8Out Board #1
06	Input 7 – Optional Digital 8In/8Out Board #1
05	Input 6 – Optional Digital 8In/8Out Board #1
04	Input 5 - Optional Digital 8In/8Out Board #1
03	Input 4 - Optional Digital 8In/8Out Board #1
02	Input 3 - Optional Digital 8In/8Out Board #1
01	Input 2 - Optional Digital 8In/8Out Board #1
00	Input 1 - Optional Digital 8In/8Out Board #1

9101 – Read Block 0: I/O (2)

Bit	Description
15	Input 8 - Optional Digital 8In/8Out Board #2
14	Input 7 - Optional Digital 8In/8Out Board #2
13	Input 6 - Optional Digital 8In/8Out Board #2
12	Input 5 - Optional Digital 8In/8Out Board #2
11	Input 4 - Optional Digital 8In/8Out Board #2
10	Input 3 - Optional Digital 8In/8Out Board #2
09	Input 2 - Optional Digital 8In/8Out Board #2
08	Input 1 - Optional Digital 8In/8Out Board #2
07	Not Used
06	Output 5 – Static Output on Motherboard
05	Output 4 - Digital Output Board
04	Output 3 - Digital Output Board
03	Output 2 - Digital Output Board
02	Output 1 - Digital Output Board
01	Not Used
00	Not Used

9101 – Read Block 0: I/O (3)

Bit	Description
15	Output 8 - Optional Digital 8In/8Out Board #1
14	Output 7 - Optional Digital 8In/8Out Board #1
13	Output 6 - Optional Digital 8In/8Out Board #1
12	Output 5 - Optional Digital 8In/8Out Board #1
11	Output 4 - Optional Digital 8In/8Out Board #1
10	Output 3 - Optional Digital 8In/8Out Board #1
09	Output 2 - Optional Digital 8In/8Out Board #1
08	Output 1 - Optional Digital 8In/8Out Board #1
07	Output 8 - Optional Digital 8In/8Out Board #2
06	Output 7 - Optional Digital 8In/8Out Board #2
05	Output 6 - Optional Digital 8In/8Out Board #2
04	Output 5 - Optional Digital 8In/8Out Board #2
03	Output 4 - Optional Digital 8In/8Out Board #2
02	Output 3 - Optional Digital 8In/8Out Board #2
01	Output 2 - Optional Digital 8In/8Out Board #2
00	Output 1 - Optional Digital 8In/8Out Board #2

**9101 – Write Block 100:
Commands High**

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 is performed if the write message is accepted.

Integer/ Decimal	Bit	Hex	Description	Action
32768	15	8000	AutoSpan RCAL <i>(for Remote Calibration)</i>	Start the auto-span function with R-CAL method. The R-Cal is automatically connected by the instrument at the beginning of the function and disconnected at its end; this operation needs a delay of 0.5 seconds. In case a R-Cal remote calibration is aborted, the <i>calibration running</i> flags will turn off after this delay. See bit <i>Confirm “Zero/Span”</i> to save the calibration.
16384	14	4000	AutoSpan WTS <i>(for remote calibration)</i>	Start the auto-span function with WTS method. An output of the Micro-Tech can be programmed to automatically load the test weights. This adds a 10 second delay at the beginning and at the end of the calibration function. In case a WTS remote calibration is aborted, the <i>calibration running</i> flags will turn off after this time. See bit <i>Confirm “Zero/Span”</i> to save the calibration.
8192	13	2000	AutoSpan CHAIN <i>(for Remote Calibration)</i>	Start the auto-span function with CHAINS method. See bit <i>Confirm “Zero/Span”</i> to save the calibration.
4096	12	1000	AutoZero <i>(for remote calibration)</i>	Start the auto-zero function. See bit <i>Confirm “Zero/Span”</i> to save the calibration.
2048	11	800	Confirm Zero/Span <i>(for remote calibration)</i>	At the end of the calibration functions (to determine the end check the “ <i>Calibration Running</i> ” in the Status 1 register), after verifying the Error (<i>Calibration Error</i> registers in Block 0), this command tells the Micro-Tech to save the new Zero or new Span (according to which calibration function has been performed). If this command is sent during a remote calibration, it aborts the running function.
1024	10	400	Stop (Abort) Batch	Stops the Batch (Load Out) sequence.

Integer/ Decimal	Bit	Hex	Description	Action
512	09	200	Stand-by Batch	Temporarily stops a Batch (Load Out) sequence. Batch can resume if a Start command is sent later.
256	08	100	Start Batch	Start the Batch (Load Out) sequence.
128	07	80	Not Used	
64	06	40	Not Used	
32	05	20	Not Used	
16	04	10	Not Used	
8	03	8	Not Used	
4	02	4	Clear Operator Total	Reset "Operator Total" Totalizer
2	01	2	Clear Reset Total	Reset "Reset Total" Totalizer
1	00	1	Reset Alarms	Reset the pending alarms if these have been previously acknowledged.

9105 Software Version: 141.00.01.10

9105 – Register Description

This section lists and describes in detail all available Registers for the Micro-Tech.

9105 – Block 0

Block “0” is the Read block that contains all the registers relevant to the Status, Alarms, I/O and Dynamic data. It is the default group the Micro-Tech sends to the master for a read request if the master does not change request.

Table 19 9105 READ BLOCK 0: Status, Alarms, I/O, Dynamic data.

Register Name	Format	Offset	Description
Status (1)	Integer	5	General Status - See “Table Status (1)”
Status (2)	Integer	6	Batch (Load out) Status - See “Table Status (2)”
Status (3)	Integer	7	Not Used
Status (4)	Integer	8	Not Used
Alarm (1)	Integer	9	See “Table Alarm (1)”
Alarm (2)	Integer	10	See “Table Alarm (2)”
Alarm (3)	Integer	11	See “Table Alarm (3)”
Alarm (4)	Integer	12	See “Table Alarm (4)”
Alarm (5)	Integer	13	See “Table Alarm (5)”
I/O Image(1)	Integer	14	See “Table I/O (1)”
I/O Image(2)	Integer	15	See “Table I/O (2)”
I/O Image(3)	Integer	16	See “Table I/O (3)”
Rate	Float	17	Instantaneous rate in engineering units as currently displayed.
Belt Load	Float	19	Instantaneous belt load in engineering units.
Belt Speed	Float	21	Instantaneous belt speed in engineering units.
Master Total	Float	23	Current value of the “Master Total” totalizer.
Reset Total	Float	25	Current value of the “Reset Total” totalizer. Reset total can be zeroed by setting a bit in the commands register.
Operator Total	Float	27	Current value of the “Operator Total” totalizer. Operator total can be zeroed by setting a bit in the commands register.
Actual Set-point Serial	Float	29	The regulation “Set-point” the instrument is using for regulation loop. This data is sent by remote (PC, PLC or DCS); is used when the instrument is in <i>Remote Mode</i>
Control Deviation	Float	31	Actual control deviation in per cent for regulation loop.

Register Name	Format	Offset	Description
Calibration Error	Float	33	Error in percent resulting from a remote calibration. The master can evaluate it before accepting the result of a remote “autozero” or “autospan”.
Displayed Set-point	Float	35	Shows the Actual Local Set-point or Actual Serial Set-point depending on if you are in Local or Remote mode.
Ingredient Ratio	Float	37	Is the percentage value used to scale down the set-point
Control Out	Float	39	Is the value of the Regulation Control in Engineering unit
Density Capacity	Float	41	Maximum Density of the scale. Entered by the operator in the Micro-Tech setup, is the reference value for the analog output.
Specific Weight	Float	43	Is the “specific weight” entered by the operator in the Micro-Tech setup and used to calculate the density of the product weighed.
Density	Float	45	Is the calculated “Density” value of the product weighed.
Actual Set-point Local	Float	47	The regulation “Set-point” the instrument is using for regulation loop. This data is set directly in the instrument through the keypad; is used when the instrument is in <i>Local Mode</i> .

9105 – Block 01

Block “1” is the Read block that contains all the registers relevant to the Batch (Load out) function

Table 20 9105 READ BLOCK 1: Batch (Load out) function.

Register Name	Format	Offset Word	Description
Batch Number	Integer	5	Number of the currently running load out or number of the last finished one. The Micro-Tech will automatically increment the batch number when a new batch is started.
Batch Deviation	Integer	6	Maximum acceptable deviation from the batch set point. Usually entered by the operator.
Batch Total	Float	7	Current contents of the “Batch (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.
Batch Set	Float	9	The “Set point” for the current or the next batch (load out). Usually entered or downloaded by the operator; the value is updated only when a batch is started.
Batch Preset	Float	11	The “Preset point” for the current or the next batch (load out). Defines when the rate will be lowered to increase batch accuracy.
Batch Preset Setpoint	Float	13	It defines the slow rate factor in percent of the actual regulation setpoint when batch preset is reached
Batch Preact	Float	15	Value of the Set point of the “Preact” for the current or the next batch. Entered or downloaded by the operator (if in MANUAL mode) or calculated by the Micro-Tech, defines when the load out has to stop to compensate the queue of material from the loading point to the scale.

9105 – Block 2

Block “2” that contains all the registers relevant to Sets and Threshold

Table 21 9105 READ BLOCK 2: Sets and Threshold

Register Name	Format	Offset Word	Description
Scale Capacity	Float	5	Maximum flow rate of the scale. Entered by the operator in the Micro-Tech setup, is the reference value for the high and low rate set points expressed in percent.
Belt Load Capacity	Float	7	Maximum belt load of the instrument. This value is not defined in the Micro-Tech setup, but it is internally computed and is the reference value for the high and low belt load set points expressed in percent.
Belt Speed Capacity	Float	9	Maximum speed of the conveyor belt. It is the reference value for the high and low speed set points expressed in percent.
High Rate Set	Float	11	Actual “High Rate” alarm value in percent of the Scale Capacity value.
Low Rate set	Float	13	Actual “Low Rate” alarm value in percent of the Scale Capacity value.
High Load Set	Float	15	Actual “High Weight” alarm value in percent of the Belt Load Capacity value.

Register Name	Format	Offset Word	Description
Low Load Set	Float	17	Actual “Low Weight” alarm value in percent of the Belt Load Capacity value.
High Speed Set	Float	19	Actual “High Speed” alarm value in percent of the Belt Speed Capacity value.
Low Speed Set	Float	21	Actual “Low Speed” alarm value in percent of the Belt Speed Capacity value.
High Positive Dev.	Float	23	Actual “High positive Deviation” alarm value for regulation loop.
High Negative Dev.	Float	25	Actual “High Negative Deviation” alarm value for regulation loop.
H-High Positive Dev.	Float	27	Actual “High-High Positive Deviation” alarm value for regulation loop.
H-High Negative Dev.	Float	29	Actual “High-High Negative Deviation” alarm for regulation loop.

9105 - Block 100

Block “100” is the Write block that is used to drive (set-reset) outputs as well as to send Commands to the Micro-Tech.

Table 22 9105 WRITE BLOCK 100: Commands

Register Name	Format	Offset Word	Limit Low	Limit High	Description
Commands High	Integer	5	0	65535	See “Table Command High”
Set/Res Out #	Integer	6	0	Installed Output Number	It is a variable that allows the master to directly handle the spare digital outputs of the Micro-Tech. There are 5 registers in the write group so the master has the capability to Set or Reset up to a maximum of five outputs simultaneously. The least significant byte of the word is used to select the number of the physical output. The most significant byte is used to set/reset the output; set the first bit to 1 for “ON”, and to 0 for “OFF”. If the content of this byte is 0, the command is ignored. WARNING: The Micro-Tech does not control if the output the master is setting/resetting is a spare or not; if the master tries to change the state of a not-spare output, a conflict could happen.
Set/Res Out #	Integer	7	0		
Set/Res Out #	Integer	8	0		
Set/Res Out #	Integer	9	0		
Set/Res Out #	Integer	10	0		

9105 - Block 101

Block “101” is the Write block used to manage the registers relevant to the Batch (Load out) function.

Table 23 9105 WRITE BLOCK 101: Batch (Load out)

Register Name	Format	Offset Word	Limit Low	Limit High	Description
Batch Number	Integer	5	0	999	-
Batch Deviation	Integer	6	0	100.0	
Batch Set	Float	7	0	10000.0	
Batch Preset	Float	9	0	10000.0	-
Batch Preset Setpoint	Float	11	0	-	-
Batch Preact	Float	13	0	10000.0	The set point of the preact for the current or the next load out. Entered or downloaded by the operator (if in MANUAL mode) or calculated by the Micro-Tech. Defines when the load out has to stop to compensate the queue of material from the loading point to the scale

9105 - Block 102

Block “102” is the Write block used to manage the registers relevant to Sets and Thresholds.

Table 24 9105 WRITE BLOCK 102: Sets and Thresholds

Register Name	Format	Offset Word	Limit Low	Limit High	Description
High Rate Set	Float	5	0	150.0%	The set point for High Rate alarm in percent of the Scale Capacity value
Low Rate set	Float	7	0	105.0%	The set point for Low Rate alarm in percent of the Scale Capacity value
High Load Set	Float	9	0	200.0%	The set point for High weight alarm in percent of the Belt Load Capacity value
Low Load Set	Float	11	0	105.0%	The set point for Low weight alarm in percent of the Belt Load Capacity value
High Speed Set	Float	13	0	150.0%	The set point for High Speed in percent of the Belt Speed Capacity value.
Low Speed Set	Float	15	0	105.0%	The set point for Low Speed in percent of the Belt Speed Capacity value.
Remote Setpoint	Float	17	0	20000	The remote regulation set point for regulation loop #1. The instrument will use this set point when in remote mode.
High Positive Dev.	Float	19	0	105.0%	Set point for High positive deviation alarm for regulation loop
H-High Positive Dev.	Float	21	0	105.0%	Set point for High-High positive deviation alarm for regulation loop
High Negative Dev.	Float	23	0	105.0%	Set point for High negative deviation alarm for regulation loop
H-High Negative Dev.	Float	25	0	105.0%	Set point for High-High negative deviation alarm for regulation loop
Ingredient Ratio	Float	27	0	100.0%	The Set of percentage value used to scale down the set-point.
Specific Weight	Float	29	0	100.0	The Set the “ <i>Specific weight</i> ” in the Micro-Tech to be used to calculate the density of the product weighed.
Density Capacity	Float	31	0	100.0	The Set of Maximum Density Capacity of the scale. It is the reference value for the analog output.

9105 – Details of Block

This section gives detailed information about each of the registers (such as the status, alarm, I/O) listed in the Read Block tables above.

9105 – Read Block 0: Status (1)

Bit	Description
15	Cumulative Shutdown (a shutdown alarm is pending)
14	Cumulative Alarms (an alarm is pending)
13	Calibration Running
12	Zero (Led)
11	Remote (Led)
10	Alarm (Led)
09	Auto (Led)
08	Ready (Led)
07	High Load (Load is higher than limit)
06	Low Load (Load is lower than limit)
05	High Rate (Rate is higher than limit)
04	Low Rate (Rate is lower than limit)
03	High Speed (Speed is higher than limit)
02	Low Speed (Speed is lower than limit)
01	Not Used
00	Not Used

9105 – Read Block 0: Status (2)

Bit	Description
15	Not Used
14	Not Used
13	Not Used
12	Not Used
11	Not Used
10	Not Used
09	Not Used
08	Not Used
07	Not Used
06	Not Used
05	Not Used
04	Not Used
03	Batch Phase bit 3
02	Batch Phase bit 2
01	Batch Phase bit 1
00	Batch Phase bit 0

Batch phase:

Only applicable if Batch Enabled:

Bits: 3 2 1 0

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 coasting time
1	x	x	x	Batch suspended

**9105 – Read Block 0:
Alarm (1)**

Each bit represents the status of an alarm. If the alarm is active, the relevant bit contains a one (1), otherwise it contains a zero (0).

Bit	Description
15	Clock Fail
14	CELL FAIL (<i>if Single Scale</i>)
13	Cell Fail 1 - (Scale 1/Channel 1)
12	Cell Fail 2 - (Scale 1/Channel 2 or Scale 2/Channel 1)
11	Cell Fail 3 - (Channel 3)
10	Cell Fail 4 - (Channel 4)
09	Not Used
08	Not Used
07	Speed Sensor Error
06	HIGH LOAD (<i>if Single Scale</i>)
05	High Load Scale # 1
04	High Load Scale # 2
03	LOW LOAD (<i>if Single Scale</i>)
02	Low Load Scale # 1
01	Low Load Scale # 2
00	HIGH RATE (<i>if Single Scale</i>)

**9105 – Read Block 0:
Alarm (2)**

Bit	Description
15	High Rate Scale # 1
14	High Rate Scale # 2
13	LOW RATE (<i>if Single Scale</i>)
12	Low Rate Scale # 1
11	Low Rate Scale # 2
10	HIGH SPEED (<i>if Single Scale</i>)
09	High Speed Scale # 1
08	High Speed Scale # 2
07	LOW SPEED (<i>if Single Scale</i>)
06	Low Speed Scale #1
05	Low Speed Scale #2
04	Warm Start
03	Cold Start
02	Power During Calibration
01	CALIBRATION TIME ELAPSED (<i>if Single Scale</i>)
00	Calibration Time Elapsed Scale # 1

**9105 – Read Block 0:
Alarm (3)**

Bit	Description
15	Calibration Time Elapsed Scale # 2
14	External Alarm 1
13	External Alarm 2
12	External Alarm 3
11	OVERFLOW TOTALIZER (<i>if Single Scale</i>)
10	Overflow Totalizer Scale #1
09	Overflow Totalizer Scale #2
08	AZT OVER LIMIT (<i>if Single Scale</i>)
07	AZT Over Limit Scale #1
06	AZT Over Limit Scale #2
05	BATCH DEVIATION (<i>if Single Scale</i>)
04	Batch Deviation Scale #1
03	Batch Deviation Scale #2
02	HW configuration Changed Slot 1
01	HW configuration Changed Slot 2
00	HW configuration Changed Slot 3

**9105 – Read Block 0:
Alarm (4)**

Bit	Description
15	HW configuration Changed Slot 4
14	Not Used
13	Not Used
12	Not Used
11	Math Error
10	Printer Error
09	Communication Error
08	Not Used
07	Profibus Error
06	High control positive deviation scale 1
05	High High control positive deviation scale 1
04	High control negative deviation scale 1
03	High High control negative deviation scale 1
02	High control positive deviation scale 2
01	High High control positive deviation scale 2
00	High control negative deviation scale 2

**9105 – Read Block 0:
Alarm (5)**

Bit	Description
15	High High control negative deviation scale 2
14	ZERO LIMIT (<i>if Single Scale</i>)
13	Zero Limit Scale #1
12	Zero Limit Scale #2
11	AZT OVER LIMIT STEP (<i>if Single Scale</i>)
10	AZT Over Limit Step Scale #1
09	AZT Over Limit Step Scale #2
08	Multiple load cell imbalance alarm
07	A/D Shutdown
06	A/D Shutdown Channel 1
05	A/D Shutdown Channel 2
04	A/D Shutdown Channel 3
03	A/D Shutdown Channel 4
02	Not Used
01	Not Used
00	Not Used

**9105 – Read Block 0: I/O
(1)**

Same as the “9101 – Read Block 0: I/O (1)” table

**9105 – Read Block 0: I/O
(2)**

Same as the “9101 – Read Block 0: I/O (2)” table

**9105 – Read Block 0: I/O
(3)**

Same as the “9101 – Read Block 0: I/O (3)” table

**9105 – Write Block 100:
Commands High**

Same as the “9101 – Write Block 100: Commands High”
table

9104 Software Version: 143.00.01.10

9104 – Register Description

This section lists and describes in detail all available Registers for the Micro-Tech.

9104 – Block 0

Block “0” is the Read block that contains all the registers relevant to the Status, Alarms, I/O and Dynamic data. It is the default group the Micro-Tech sends to the master for a read request if the master does not change request.

Table 25 9104 READ BLOCK 0: Status, Alarms, I/O, Dynamic data.

Register Name	Format	Offset Word	Description
Status (1)	Integer	5	General Status - See “Table Status 1”
Status (2)	Integer	6	Batch (Load out) Status - See “Table Status 2”
Status (3)	Integer	7	Not Used
Status (4)	Integer	8	Not Used
Alarm (1)	Integer	9	See “Table Alarm 1”
Alarm (2)	Integer	10	See “Table Alarm 2”
Alarm (3)	Integer	11	See “Table Alarm 3”
Alarm (4)	Integer	12	See “Table Alarm 4”
Alarm (5)	Integer	13	See “Table Alarm 5”
I/O Image(1)	Integer	14	See “Table I/O Image 1”
I/O Image(2)	Integer	15	See “Table I/O Image 2”
I/O Image(3)	Integer	16	See “Table I/O Image 3”
End Refill Time	Integer	17	Waiting Time in seconds after the end of Refill before restart regulation and computation.
Refill Timeout	Integer	18	Time in seconds within which the refill of the LIW Hopper must be completed. When this time is elapsed, an alarm is activated.
Rate	Float	19	Instantaneous rate in engineering units as currently displayed.
Weight	Float	21	Instantaneous load in engineering units.
Master Total	Float	23	Current value of the “Master Total” totalizer.
Reset Total	Float	25	Current value of the “Reset Total” totalizer. Reset total can be zeroed by setting a bit in the commands register.
Actual Set-point Serial	Float	27	The regulation “Set-point” the instrument is using for regulation loop. This data is sent by remote (PC, PLC or DCS); is used when the instrument is in Remote Mode.
Control Deviation	Float	29	Actual control deviation in per cent for regulation loop.
Calibration Error	Float	31	Error in percent resulting from a remote calibration. The master can evaluate it before accepting the result of a remote “autozero” or “autospan”.
Actual Set-point	Float	33	The regulation “Set-point” the instrument is using for regulation loop. This will be the Remote value or the Local value depending on which mode it is in.

Register Name	Format	Offset Word	Description
Ingredient Ratio	Float	35	Is the percentage value used to scale down the set-point.
Control Out	Float	37	Is the value of the Regulation Control in Engineering unit.
Set Point Local	Float	39	The regulation “Set-point” the instrument is using for regulation loop. This data is set directly in the instrument through the keypad; is used when the instrument is in Local Mode.

9104 - Block 1

Block “1” is the Read block that contains all the registers relevant to the Batch (Load out) function.

Table 26 9104 READ BLOCK 1: Batch (Load out) function.

Register Name	Format	Offset Word	Description
Batch Number	Integer	5	Number of the currently running load out or number of the last finished one. The Micro-Tech will automatically increment the batch number when a new batch is started.
Batch Deviation	Integer	6	Maximum acceptable deviation from the batch set point. Usually entered by the operator.
Batch Total	Float	7	Current contents of the “Batch (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.
Batch Set	Float	9	The “Set point” for the current or the next batch (load out). Usually entered or downloaded by the operator; the value is updated only when a batch is started.
Batch Preset	Float	11	The “Preset point” for the current or the next batch (load out). Defines when the rate will be lowered to increase batch accuracy.
Batch Preset Setpoint	Float	13	It defines the slow rate factor in percent of the actual regulation set-point when batch preset is reached
Batch Preact	Float	15	Value of the Set point of the “Preact” for the current or the next batch. Entered or downloaded by the operator (if in MANUAL mode) or calculated by the Micro-Tech, defines when the load out has to stop to compensate the queue of material from the loading point to the scale.

9104 - Block 2

Block “2” is the Read block that contains all the registers relevant to Sets and Thresholds.

Table 27 9104 READ BLOCK 2: Sets and Thresholds

Register Name	Format	Offset Word	Description
Scale Capacity	Float	5	Maximum load of the scale. Entered by the operator in the Micro-Tech setup, is the reference value for the high and low weight set points expressed in percent.
Rate Capacity	Float	7	Maximum flow rate of the scale. Entered by the operator in the Micro-Tech setup, is the reference value for the high and low rate set points expressed in percent.
Start Refill	Float	9	Actual weight for starting the Refill cycle in percent of scale capacity
End Refill	Float	11	Actual weight for stopping the Refill cycle in percent of scale capacity.
High Rate	Float	13	Actual “High Rate” alarm value in percent of the Scale Capacity value.
Low Rate	Float	15	Actual “Low Rate” alarm value in percent of the Scale Capacity value.
High Weight	Float	17	Actual “High Weight” alarm value in percent of the Belt Load Capacity value.
Low Weight	Float	19	Actual “Low Weight” alarm value in percent of the Belt Load Capacity value.
High Positive	Float	21	Actual “High positive Deviation” alarm value for regulation loop.
High Negative	Float	23	Actual “High Negative Deviation” alarm value for regulation loop.
H-High Positive	Float	25	Actual “High-High Positive Deviation” alarm value for regulation loop.
H-High Negative	Float	27	Actual “High-High Negative Deviation” alarm for regulation loop.

9104 – Block 100

Block “100” is the Write block that is used to drive (set-reset) outputs as well as to send Commands to the Micro-Tech

Table 28 9104 WRITE BLOCK 100: Commands

Register Name	Format	Offset Word	Limit Low	Limit High	Description
Commands High	Integer	5	0	65535	See “Table Command High”
Set/Res Out #	Integer	6	0	Installed Output Number	It is a variable that allows the master to directly handle the spare digital outputs of the Micro-Tech. There are 5 registers in the write group so the master has the capability to Set or Reset up to a maximum of five outputs simultaneously. The least significant byte of the word is used to select the number of the physical output. The most significant byte is used to set/reset the output; set the first bit to 1 for “ON”, and to 0 for “OFF”. If the content of this byte is 0, the command is ignored.setting/resetting is a spare or not; if the master tries to change the state of a not-spare output, <u>a conflict could happen.</u>
Set/Res Out #	Integer	7	0		
Set/Res Out #	Integer	8	0		
Set/Res Out #	Integer	9	0		
Set/Res Out #	Integer	10	0		

9104 - Block 101

Block “101” is the Write block used to manage the registers relevant to the Batch (Load out) function

Table 29 9104 WRITE BLOCK 101: Batch (Load out)

Register Name	Format	Offset Word	Limit Low	Limit High	Description
Batch Number	Integer	5	0	999	-
Batch Deviation	Integer	6	0	100.0	
Batch Set	Float	7	0	10000.0	
Batch Preset	Float	9	0	10000.0	-
Batch Preset Setpoint	Float	11	0	-	-
Batch Preact	Float	13	0	10000.0	The set point of the preact for the current or the next load out. Entered or downloaded by the operator (if in MANUAL mode) or calculated by the Micro-Tech. Defines when the load out has to stop to compensate the queue of material from the loading point to the scale
Ingredient Ratio	Float	15	0	100	Is the percentage value used to scale down the set-point.

9104 – Block 102

Block “102” is the Write block used to manage the registers relevant to Sets and Thresholds.

Table 30 9104 WRITE BLOCK 102: Sets and Thresholds

Register Name	Format	Offset Word	Limit Low	Limit High	Description
End Refill Time Set	Integer	5	0	-	Waiting Time in seconds after the end of Refill before to restart regulation and computation.
Refill Timeout Set	Integer	6	0	-	Time in seconds within which the refill of the LIW Hopper must be completed.
High Rate Set	Float	7	0	105.0%	The set point for High Rate alarm in percent of the Scale Capacity value
Low Rate Set	Float	9	0	105.0%	The set point for Low Rate alarm in percent of the Scale Capacity value
High Weight Set	Float	11	0	105.0%	The set point for High weight alarm in percent of the Scale Capacity value
Low Weight Set	Float	13	0	105.0%	The set point for Low weight alarm in percent of the Scale Capacity value
Remote Setpoint	Float	15	0	200000	The remote regulation set point for regulation loop #1. The instrument will use this set point when in remote mode.
High Positive Dev.	Float	17	0	105.0%	Set point for High positive deviation alarm for regulation loop
H-High Positive Dev.	Float	19	0	105.0%	Set point for High-High positive deviation alarm for regulation loop
High Negative Dev.	Float	21	0	105.0%	Set point for High negative deviation alarm for regulation loop
H-High Negative Dev.	Float	23	0	105.0%	Set point for High-High negative deviation alarm for regulation loop
Ingredient Ratio	Float	25	0	100.0%	The Set of percentage value used to scale down the set-point.
Start Refill Set	Float	27	0	100.0%	Set-point weight for starting the Refill cycle in percent of scale capacity
End Refill Set	Float	29	0	100.0%	Set-point weight for stopping the Refill cycle in percent of scale capacity.

9104 - Details of Blocks

This section gives detailed information about each of the registers (such as the status, alarm, I/O) listed in the Read Block tables above.

9104 – Read Block 0: Status (1)

Bit	Description
15	Cumulative Shutdown (a shutdown alarm is pending)
14	Cumulative Alarms (an alarm is pending)
13	Calibration Running
12	Remote (LED)
11	Auto (led)
10	Refill
09	Running
08	Ready (led)
07	High Weight (load is higher than limit)
06	Low Weight (load is lower than limit)
05	High Rate (rate is higher than limit)
04	Low Rate (rate is lower than limit)
03	Not Used
02	Not Used
01	Not Used
00	Profibus Write Error

9104 – Read Block 0: Status (2)

Bit	Description
15	High Positive deviation
14	High High Positive Deviation
13	High Negative Deviation
12	High High Negative Deviation
11	Not Used
10	Not Used
09	Not Used
08	Not Used
07	Not Used
06	Not Used
05	Not Used
04	Not Used
03	Batch Phase □ Bit 3 (see table below)
02	Batch Phase □ Bit 2 (see table below)
01	Batch Phase □ Bit 1 (see table below)
00	Batch Phase □ Bit 0 (see table below)

Batch phase

Only applicable if

Batch Enabled:

Bits	3	2	1	0	
	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 coasting time
	1	x	x	x	Batch suspended

**9104 – Read Block 0:
Alarm (1)**

Each bit represents the status of an alarm. If the alarm is active, the relevant bit contains a one (1), otherwise it contains a zero (0).

Bit	Description
15	Clock Fail
14	CELL FAIL (<i>if Single Scale</i>)
13	Cell Fail 1 - (Scale 1/Channel 1)
12	Cell Fail 2 - (Scale 1/Channel 2 or Scale 2/Channel 1)
11	Cell Fail 3 - (Channel 3)
10	Cell Fail 4 - (Channel 4)
09	RAM Fail
08	ROM Fail
07	HIGH WEIGHT (<i>if Single Scale</i>)
06	High Weight Scale # 1
05	High Weight Scale # 2
04	LOW WEIGHT (<i>if Single Scale</i>)
03	Low Weight Scale # 1
02	Low Weight Scale # 2
01	HIGH RATE (<i>if Single Scale</i>)
00	High Rate Scale # 1

**9104 – Read Block 0:
Alarm (2)**

Bit	Description
15	High Rate Scale # 2
14	LOW RATE <i>(if Single Scale)</i>
13	Low Rate Scale # 1
12	Low Rate Scale # 2
11	Warm Start
10	Cold Start
9	Power During Calibration
8	CALIBRATION TIME ELAPSED <i>(if Single Scale)</i>
7	Calibration Time Elapsed Scale # 1
6	Calibration Time Elapsed Scale # 2
5	External Alarm 1
4	External Alarm 2
3	External Alarm 3
2	HW configuration Changed Slot 1
1	HW configuration Changed Slot 2
0	HW configuration Changed Slot 3

**9104 – Read Block 0:
Alarm (4)**

Bit	Description
15	High High control Negative deviation <i>(if Single Scale)</i>
14	High High control Negative deviation scale 1
13	High High control Negative deviation scale 2
12	Refill Time Out <i>(If Single Scale)</i>
11	Refill Time out Scale 1
10	Refill Time Out Scale 2
09	Overflow Totalizer <i>(If Single Scale)</i>
08	Overflow Totalizer Scale 1
07	Overflow Totalizer Scale 2
06	Batch Deviation <i>(If Single Scale)</i>
05	Batch Deviation Scale 1
04	Batch Deviation Scale 2
03	Not Used
02	Profibus Error
01	Multiple load cell imbalance alarm
00	EXCITATION CELL FAIL

**9104 – Read Block 0:
Alarm (5)**

Bit	Description
15	A/D Shutdown Channel 1
14	A/D Shutdown Channel 2
13	A/D Shutdown Channel 3
12	A/D Shutdown Channel 4
11	Not Used
10	Not Used
9	Not Used
8	Not Used
7	Not Used
6	Not Used
5	Not Used
4	Not Used
3	Not Used
2	Not Used
1	Not Used
0	Not Used

**9104 – Read Block 0: I/O
(2)**

Same as the “9101 – Read Block 0: I/O (1)” table

**9104 – Read Block 0: I/O
(2)**

Same as the “9101 – Read Block 0: I/O (2)” table

**9104 – Read Block 0: I/O
(3)**

Same as the “9101 – Read Block 0: I/O (3)” table

**9104 – Write Block
100: Commands High**

Bit	Description	Action
15	AutoSpan RCAL <i>(for Remote Calibration)</i>	Start the auto-span function with R-CAL method. The R-Cal is automatically connected by the instrument at the beginning of the function and disconnected at its end; this operation needs a delay of 0.5 seconds. In case a R-Cal remote calibration is aborted, the <i>calibration running</i> flags will turn off after this delay. <i>See bit 04 to save the calibration.</i>

14	AutoSpan WTS <i>(for remote calibration)</i>	Start the auto-span function with WTS method. An output of the Micro-Tech can be programmed to automatically load the test weights; this adds a 10 second delay at the beginning and at the end of the calibration function. In case a WTS remote calibration is aborted, the <i>calibration running</i> flags will turn off after this time. <i>See bit 04 to save the calibration.</i>
13	Not USED	
12	AutoZero <i>(for remote calibration)</i>	Start the auto-zero function. <i>See bit 04 to save the calibration.</i>
11	Confirm Zero/Span <i>(for remote calibration)</i>	At the end of the calibration functions (to determine the end check the “ <i>Calibration Running</i> ” in the Status 1 register), after to have verified the Error (<i>Calibration Error</i> registers in Block 0), this command tells the Micro-Tech to save the new Zero or new Span (according to which calibration function has been performed). If this command is sent during a remote calibration, it aborts the running function.
10	Stop (Abort) Batch	Stops the Batch (Load Out) sequence.
9	Stand-by Batch	Temporarily stops a Batch (Load Out) sequence. Batch can resume if a Start command is sent later.
8	Start Batch	Start the Batch (Load Out) sequence.
7	Not Used	
6	Not Used	
5	Not Used	
4	Not Used	
3	Not Used	
2	Not Used	
1	Clear Reset Total	Reset “Reset Total” Totalizer
0	Reset Alarms	Reset the pending alarms if these have been previously acknowledged.

Glossary

A/D channel Analog/Digital channel. An electronic

sub-unit on the Micro-Tech motherboard that handles the load-cell(s) input. Your Micro-Tech motherboard is equipped with two A/D channels, but the dual A/D printed-circuit-board assembly can be ordered as an option.

AZT Auto zero-tracking.

Belt-scale code This code describes your exact

belt-scale set-up and allows the Micro-Tech to set the relevant menu defaults for you. Please write down your belt-scale code before contacting SRO Technology for help.

Console The main operating panel of the Micro-Tech including the display, keypad, arrow buttons, and soft keys.

DIO A digital-input/output board.

display In the console, the small square screen

that displays Micro-Tech results, menus, and so forth.

kg Kilogram.

kg/h Kilograms per hour.

kg/min Kilograms per minute.

Lb/hr Pounds per hour.

Lb/mn Pounds per minute.

Lt/min Long tons per minute.

LTons The “long ton,” equivalent to 2,240 lbs.

LTph Long tons per hour.

Mixed units A menu choice that allows the Micro-Tech to display a mixture of English and metric units.

mV/V Millivolts per volt.

A measure of the sensitivity of a load cell.

pcba Printed-circuit board assembly.

PEIC Periodic-error-integrating control.

PID Proportional, integral, derivative control.

Scroll When used as a noun (for example, when the word appears in the Micro-Tech display), it means “menu.” When used as a verb (for example, “Scroll down to...”), it means press the up- or down-arrow button to move to one of the Micro-Tech menus.

Soft key One of the four buttons at the bottom of the Micro-Tech display that allows you to access various context-sensitive Micro-Tech commands—such as Edit, Enter, Continue, and so forth.

Standard (US) ton Equivalent to 2,000 lbs.

t/hr Metric tons per hour.

t/min Metric tons per minute.

T/mn Standard US tons/minute.

Ton Standard (2,000# or 2,000 lb.) tons per hour.

tonne The “metric tonne” equivalent to 1,000 kg.

Tph Tons per hour.

Totalizer The Totalizer shows the total tons accumulated by the Micro-Tech.

Weigh-bridge Another name for a scale.

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