

Garvens Automation GmbH
Development Dept.

Description
Remote Control
GARECO

version 01.08

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1. General

1.1 The GARECO remote control

The remote control of GARVENS checkweighers was given the name "GARECO" which is the abbreviation of Garvens Remote Control.

Remote control instructions can be transmitted by an external PC via the serial interface to the weighing terminal, with all remote control actions being effected by the PC. The checkweigher reacts to instructions which it has recognized and releases the corresponding action. The instructions consist of ASCII strings, each of which ends with the characters *CR* and *LF*.

1.2 Annotations

Text using this normal print is descriptive and explanatory text.

Remote control instructions are included in high commas (inverse commas) and printed in capital letters (example: "INSTRUCTION"). The high commas (inverse commas) are not part of the instruction itself!

| Special characters: | | |
|----------------------------|---|----------------------------|
| <u>Abreviation:</u> | <u>Meaning:</u> | <u>ASCII character(s):</u> |
| (CR) | Carriage Return | Dec. 13, Hex 0D |
| (LF) | Line Feed | Dec. 10, Hex 0A |
| _ | Underline | Dec. 95, Hex 5F |
| ␣ | Space (blank) | Dec. 32, Hex 20 |
| XXXXXXXXXX | represents a <u>fixed</u> number of characters | |
| vvvvvvvvvv | represents a <u>variable but limited</u> number of characters | |

2. GARECO protocol

2.1 General inquiries

2.1.1 Inquire article

| Computer: | Checkweigher: |
|-----------------------|-----------------------------|
| ----- | |
| "FB_ART_NAMES(CR)(LF) | => |
| | <= "FB_AN~vvvvvvvv(CR)(LF)" |
| | <= ... |
| | <= "FB_AN_ENDE(CR)(LF)" |

This function allows for inquiring the names of the articles stored in the checkweigher's memory. Per stored article, the checkweigher sends a string in the form "FB_AN~vvvvvvvv(CR)(LF)" with vvvvvvvv being the article name.

2.1.2 Inquire program options

| Computer: | Checkweigher: |
|------------------|--------------------------------|
| ----- | |
| "FB_INFO(CR)(LF) | => |
| | <= "XXXXXXXX~Y~Y~Y...(CR)(LF)" |

This function allows for inquiring the program options of the checkweigher configuration. The answer string which is sent back from the checkweigher consists of 9 numbers which form the weigher number, followed by identity letters of the program options.

With

- "S" being the statistics program,
- "R" being the feedback control program,
- "G" being the gliding limits (mean value tracking) program,
- "F" being the filling head test program, and
- "W" being the mean value trend monitoring program (trend watching)
- "M" being the metal detector program

Example:

"FB_INF~50505~---S~G(CR)(LF)" The checkweigher No. 50505 is equipped with the statistics program and gliding limits (mean value tracking) program.

2.2 Upload/download of article data

2.2.1 Data blocks

Each article stored in the checkweigher's memory consists of several basic data such as the article name, nominal weight, and further optional data (parameters). Whether such optional parameters are used depends on the program options purchased by the customer i. e. enabled. For example, when the statistics program exists, 10 more article parameters are used for the statistics program.

This means that there is no fixed number of parameters which describe the article data of an article. In order to support all parameters which are possible and to remain independent of the checkweigher configuration, the following method has been chosen:

The transmission of the parameters of an article is divided in several separate blocks. Every block begins with an identification, followed by the data, and ends with *(CR)(LF)*. The uploading and downloading of articles is based upon these transmission blocks. More details can be found in the next chapters.

The structure within the transmission blocks is unequivocally defined for every individual block. Within a block it is possible that certain parameters are used only in the case of certain options. How such optional parameters are treated is described in the sections "download of a certain article" and "upload of a certain article".

The pages that follow describe the GARECO version 01.08.

Novelties in the history of the protocol are marked by the note "as of GARECO 01.xx".

Transmission blocks

| Data | Meaning | Type | Values |
|----------------------|--|------|--------------------------------|
| FB_GRUND→ | block identification of the basic article data | | |
| XXXX→ | GARECO version number | char | "01.08" |
| XXXXXXXXXX→ | article name | char | no blank in the first 2 chars. |
| XXXXXXXXXXXXXX→ | EAN code | char | |
| XXXX | weight unit* | int | {0, 1} |
| (CR)(LF) | block termination | | |
| total: 46 characters | | | |

* 0 = g; 1 = kg. This unit applies for further weight indications.

| Data | Meaning | Type | Values | Only in the case of |
|----------------------|---|-------|-----------------|---|
| FB_DATA→ | block identification of article data | | | |
| XXXXXXXX→ | nominal weight | float | | |
| XXXXXXXX→ | mean fixed tare | float | | |
| XXXX→ | length of the article (length of one product) | int | [0-9999] | skew detection, open flap detection, or when WLB deadtime = yes |
| XXXX→ | No. of products for "successive errors detection" | int | [0-99] | |
| XXXX→ | target throughput [pcs./minute] | int | [5-999] | |
| XXXX→ | measuring time | int | [1-15] | IIR filter |
| XXXXXXXX→ | correction factor | float | [0.8000-1.2000] | calibration by the authorities = no |
| XXXX→ | max. length | int | [0-9999] | length check |
| XXXXXXXX | specific density | float | | volumetric filling |
| (CR)(LF) | block termination | | | |
| total: 70 characters | | | | |

| Data | Meaning | Type | Values | Only in the case of |
|----------------------|---|-------|-----------|---------------------|
| FB_GRENZEN→ | block identification of the classification limits | | | |
| XXXXXXXX→ | limit PLUS 3 | float | - | 6 limits |
| XXXXXXXX→ | limit PLUS 2 | float | > Plus 1 | 4 limits |
| XXXXXXXX→ | limit PLUS 1 | float | > Nominal | |
| XXXXXXXX→ | limit MINUS 1 | float | < Nominal | |
| XXXXXXXX→ | limit MINUS 2 | float | < Minus 1 | 4 limits |
| XXXXXXXX | limit MINUS 3 | float | - | 6 limits |
| (CR)(LF) | block termination | | | |
| total: 66 characters | | | | |

| Data | Meaning | Type | Values | Only in the case of |
|----------------------|--|-------|-----------|---------------------|
| FB_STAT→ | block identification of the statistics of an article | | | |
| XXXXXXXXXX→ | batch number | char | | |
| XXXXXXXXXX→ | tolerance limit TO 2 | float | | - (at present) |
| XXXXXXXXXX→ | tolerance limit TO 1 | float | | - (at present) |
| XXXXXXXXXX→ | tolerance limit TU 1 | float | | legislation = FREE |
| XXXXXXXXXX→ | tolerance limit TU 2 | float | | legislation = FREE |
| XXXX→ | tolerance system (production legislation) ¹ | int | {0, 1, 2} | |
| XXXX→ | TU 1 percentage ² | int | {0, 1, 2} | |
| XXXX→ | type of interval ³ | int | {0, 1} | |
| XXXX→ | scope of one interval [pcs.] | int | {20-9999} | |
| | or [minutes] | int | {1-60} | |
| XXXX | statistics on/off ⁴ | int | {0, 1} | |
| (CR)(LF) | block termination | | | |
| total: 81 characters | | | | |

¹ 0 = free; 1 = EC- (EG-); 2 = US (only possible with "S" and "E" series checkweighers)

NOTE: Use the instruction "FB_SET_TOLSYST" for setting the tolerance system (production legislation) of an article. This field is intended to serve as an enquiry only.

² 0 = 2 %; 1 = 2.5 %; 2 = 5 %

² 0 = 0 %; 1 = 2 %; 2 = 2.5 %; 3 = 5 % (as of GARECO version 01.04)

³ 0 = pcs.; 1 = time (minutes)

⁴ 0 = OFF; 1 = ON

| Data | Meaning | Type | Values | Only in the case of |
|----------------------|---|-------|---|----------------------|
| FB_TR→ | block identification of feedback control | | | |
| XXXXXXXXXX→ | tolerance+ | float | < high limit | |
| XXXXXXXXXX→ | tolerance- | float | > low limit | |
| XXXXXXXXXX→ | high limit | float | > tolerance+ | |
| XXXXXXXXXX→ | low limit | float | < tolerance- | |
| XXXXXXXXXX→ | overflow | float | [0-9.9] | |
| XXXX→ | No. of pcs. (qty.) for mean value calculation | int | [5-999] | |
| XXXX→ | neutral distance [pcs.] | int | [0-999] | |
| XXXX→ | start phase [pcs.] | int | [0-999] | |
| XXXX→ | start value [Hz] | int | [250-2500] | vacuum filling mach. |
| XXXXXXXXXX→ | control factor ¹ | float | [0.005-15] (servo) [0.1-99] (vacuum) | |
| XXXX | feedback controlling on/off ² | int | {0, 1} | |
| (CR)(LF) | block termination | | | |
| total: 86 characters | | | | |

¹ in the case of vacuum controllers: Hz/g

¹ in the case of servo controllers: sec./g

¹ in the case of pulse controllers: pulses/g

² 0 = OFF; 1 = ON

| Data | Meaning | Type | Values |
|-----------|--|-------|-----------------------------------|
| FB_GLEIT→ | block id. of gliding limits (mean value track.) | | |
| XXXXXXXX→ | reference weight | float | 0.0 or Nom.-(T1-)<Ref.<Nom.+(T1+) |
| XXXXXXXX→ | high limit | float | > Nom. + (T1+) |
| XXXXXXXX→ | T1+ limit (difference) | float | > 0 and Nom. + (T1+) < high limit |
| XXXXXXXX→ | T1- limit (difference) | float | > 0 and Nom. - (T1-) > low limit |
| XXXXXXXX→ | low limit | float | < Nom. - (T1-) |
| XXXX | gliding limits (mean value tracking) on/off ¹ | int | {0, 1} |
| (CR)(LF) | block termination | | |

total: 60 characters

¹ 0 = OFF; 1 = ON

| Data | Meaning | Type | Values | Only in the case of |
|-----------|------------------------------------|-------|----------|---------------------|
| FB_FKT→ | block id. of "fill head test" | | | |
| XXXX→ | number of cycles | int | [1 - 99] | |
| XXXX→ | neutral distance | int | [1 - 99] | |
| XXXXXXXX→ | high limit | float | | |
| XXXXXXXX→ | low limit | float | | |
| XXXX→ | automatic printing ¹ | int | {0, 1} | printer |
| XXXX | fill head test on/off ¹ | int | {0, 1} | |
| (CR)(LF) | block termination | | | |

total: 46 characters

¹ 0 = OFF; 1 = ON

| Data | Meaning | Type | Values |
|-----------|--|-------|--------------|
| FB_MWG→ | block id. of "mean value trend monitoring" | | |
| XXXX→ | number of pcs. (qty.) for the mean value | int | [0 - 99] |
| XXXXXXXX→ | high limit | float | > low limit |
| XXXXXXXX→ | low limit | float | < high limit |
| XXXX | monitoring on/off ¹ | int | {0, 1} |
| (CR)(LF) | block termination | | |

total: 36 characters

¹ 0 = OFF; 1 = ON

| Data | Meaning | Type | Values |
|------------|--|------|------------|
| FB_METALL→ | block id. for metal detector's data | | |
| XXXX→ | product memory No. (article memory location) | int | [1 - 17] |
| XXXX→ | sensitivity | int | [0 - 199] |
| XXXX | phase adjustment | int | [0 - 5788] |
| (CR)(LF) | block termination | | |

total: 26 characters

The block for metal detection data is available as of GARECO version 01.06

Field setup

| Type | No. of characters | Example | Format |
|-------|-------------------|----------|---|
| int | 4 | 12-- | left-aligned, ending with spaces (blanks) |
| long | 8 | 999999-- | left-aligned, ending with spaces (blanks) |
| float | 8 | 123.456- | left-aligned, decimal point is optional |
| char | variable | ABC-- | left-aligned |

2.2.2 Download of a certain article

The article data of a certain article can be inquired by means of an external computer which has to send the instruction "FB_SENDEN-*vvvvvvvvv*(CR)(LF)" to the checkweigher, with *vvvvvvvvv* being the name of the desired article. The instruction "FB_SENDEN(CR)(LF)" can be used for inquiring the data of the current i. e. active article. When the checkweigher has recognized the instruction, it tries to find the desired article in the memory. If the article cannot be found, the checkweigher sends an error string: "FB_ERR_AR_NOT_FOUND(CR)(LF)".

If the checkweigher has found the article, it sends the data blocks to the computer – unless the concerned article is just being edited on the weighing terminal, in this case the checkweigher the message "FB_ERR_EDIT(CR)(LF)" back to the computer; the inquiry of article data is possible only after editing of the article has been finished.

The following data blocks are transmitted:

| | |
|--------------|--|
| "FB_GRUND" | is always transmitted. |
| "FB_DATA" | is always transmitted. |
| "FB_GRENZEN" | is <u>not</u> transmitted when the gliding limits program (mean val. track.) has been purchased. |
| "FB_STAT" | is transmitted only if the statistics program has been purchased. |
| "FB_TR" | is transmitted only if the feedback control program has been purchased. |
| "FB_GLEIT" | is transmitted only if the gliding limits program (mean value tracking) has been purchased. |
| "FB_FKT" | is transmitted only if the "fill head test" program has been purchased. |
| "FB_MWG" | is transmitted only if the "mean value trend monitoring" program has been purchased. |
| "FB_METALL" | is transmitted only if the "metal detection input" has been purchased/metal det. is connected |

When the checkweigher has sent all blocks, it communicates the end of the transmission by means of the string "FB_ENDE(CR)(LF)".

The fields *XXXXXXXX* either contain a value corresponding to the types stated above, or "-----" when a certain value does not exist for the article. Due to this principle the external computer can recognize which parameters are used in fact for the article data of the concerned article.

Example: A checkweigher is configured with 2 limits. The limit T1+ be 110.0 g and the limit T1- be 90.0 g. In this case, the block FB_GRENZEN would look as follows:

"FB_GRENZEN-----110.0---90.0----- (CR)(LF)"

It is also possible to inquire the data blocks individually i. e. one after another. This means that the instruction must be extended by a block identification (possible with GARECO 01.04 and higher). Example: "FB_SENDEN +1 *vvvvvvvvv*(CR)(LF)" only inquires the first data block. If an identification for which there is no data block is used, the string "FB_ENDE(CR)(LF)" will be sent as answer.

Summary:

- Instructions: FB_SENDEN-*XXXXXXXXXX*(CR)(LF)
- FB_SENDEN(CR)(LF)
- FB_SENDEN-+X-*XXXXXXXXXX*(CR)(LF)
- FB_SENDEN-+X(CR)(LF)
- Error mess.: FB_ERR_AR_NOT_FOUND(CR)(LF)
- FB_ERR_EDIT(CR)(LF)

2.2.3 Upload of a certain article

The external computer can send the article data of an article to the checkweigher. The checkweigher will create a new article (based upon the received data) in the memory, or overwrite an existing article if it recognizes that the article name does already exist in the memory.

As explained above, the article parameters which are used may vary, depending on the checkweigher configuration. The external computer needs not know this configuration – it sends all article data it has got about a certain article; the checkweigher extracts the required (depending on the configuration) data from the transmission blocks and uses this information to create the article in the memory.

ATTENTION: The external computer must ensure the consistency of the transmitted data and that value ranges will be observed.

The external computer starts the transmission of article data to the checkweigher by means of the instruction "FB_LADEN(CR)(LF)". When the checkweigher recognizes this instruction, it sends "FB_ERR_NO_MEMORY(CR)(LF)" when there is no more memory location available for this new article, or "FB_ERR_EDIT(CR)(LF)" when the concerned article is just being edited on the weighing terminal, or "FB_ERR_TWICE(CR)(LF)" when an upload has already been started but not finished yet, or normally "FB_LOAD_STARTED_XX.XX(CR)(LF)" (with XX.XX being the version number).

When the checkweigher is ready for reception, and if the version numbers of the two protocols are identical, the computer begins to send the data blocks described above to the checkweigher. The format is the same as above.

The uploading must end with the instruction "FB_ENDE(CR)(LF)" or can be aborted with "FB_ABBRUCH(CR)(LF)" without creation, or modification respectively, of an article.

With regard to the above-mentioned procedure, two problematic situations may occur:

1. The external computer sends data which is not required by the checkweigher.
In principle, this does not cause any problems for the checkweigher, however, the computer cannot find out whether all transmitted data has been accepted by the checkweigher. Therefore an acknowledgement block is sent as an answer to every transmitted data block.
2. The external computer does not send enough data.
For example, the checkweigher is equipped with the statistics program but the external computer does not send the block FB_STAT to the checkweigher. In this case the checkweigher will use default values instead continue working with these values. When the transmission from the computer to the checkweigher has ended, the checkweigher sends another acknowledgement block which states the blocks that were received.

Acknowledgement blocks

An acknowledgement block for a single transmission block looks as follows:

FBQU_GRENZEN-0-XX-0

A character is used for every parameter of a block, with

X (Hex 58) meaning: parameter was correct and accepted

O (Hex 30) meaning: parameter was unnecessary

- (Hex 2D) meaning: parameter could not be accepted

Example:

A checkweigher has been configured with 4 limits. The external computer sends the transmission block FB_GRENZEN to the checkweigher:

"FB_GRENZEN-----|20.0-----|10.0-----

90.0------(CR)(LF)"

Then the checkweigher sends "FBQU_GRENZEN-0XXX-0" back to the computer; and it uses a default value instead of the missing but required parameter.

Acknowledgment message back to the external computer

A similar acknowledgement exists for the complete transmission blocks. The checkweigher communicates every received block and every required block to the external computer; every transmission block is given an identity number by the checkweigher:

Identity number: block

```
-----
1      : FB_GRUND
2      : FB_DATA
3      : FB_GRENZEN
4      : FB_STAT
5      : FB_TR
6      : FB_GLEIT
7      : FB_FKT
8      : FB_MWG
9      : FB_METALL
```

After the checkweigher has received the instruction "FB_ENDE(CR)(LF)" it sends the acknowledgement block "FBQU_BLOECKE xy xy ... (CR)(LF)" with x representing the identity number of a block and y representing either X or O or - (same meaning as above).

After the cancel instruction "FB_ABBRUCH(CR)(LF)" the checkweigher sends a cancellation acknowledgement message: "FBQU_ABBRUCH(CR)(LF)".

Example:

The checkweigher is equipped with the statistics program but not with the feedback control program. The external computer sends the blocks FB_GRUND, FB_DATA, FB_GRENZEN and FB_TR. Then it receives the answer from the checkweigher i. e. the following acknowledgement block:

"FBQU_BLOECKE-1X-2X-3X-4--50".

Due to this acknowledgement block the external computer can recognize that the statistics block was missing and the feedback control block was not needed. The gliding limits (mean value tracking) block was neither needed nor transmitted, therefore it has not been mentioned in the acknowledgement block at all.

Summary:

Instructions: FB_LADEN(CR)(LF)
 FB_XXXX→... (CR)(LF)
 ...
 FB_ENDE(CR)(LF)
 FB_ABBRUCH(CR)(LF)
 Error mess.: FB_ERR_NO_MEMORY(CR)(LF)
 FB_ERR_EDIT(CR)(LF)
 FB_ERR_TWICE(CR)(LF)
 FB_LOAD_STARTED 01.05(CR)(LF)

2.2.4 Modification of the article data of the checkweigher's current article

At times only few data of the current i. e. active article have to be modified. E. g. the tare or the scope of interval for the statistics program can be modified without the need to create a new article in the memory. The external computer starts the modification of article data of the current article by means of the instruction FB_LADEN(CR)(LF).

Now the computer can begin to send the transmission blocks which contain modified values to the checkweigher. Unlike the uploading of an article, in this case it is not necessary to send all transmission blocks. But the block FB-GRUND must always be sent, because it contains the name of the article which is to be modified in the checkweigher's memory. This article name will be searched in the checkweigher's memory, and the data of the concerned article will be modified.

For every block sent, the external computer will receive a parameter acknowledgement block. The external computer stops the sending of transmission blocks by means of the instruction "FB_ENDE(CR)(LF)"; afterwards it receives an acknowledgement block for the sent transmission blocks. Abortion is possible here, too, by means of "FB_ABBRUCH(CR)(LF)".

Example:

Tare modification of the article "0000000002"; was: 10 g, now to be: 12 g

Computer:

Checkweigher:

```

-----
"FB_LADEN(CR)(LF)"    =>
"FB_GRUND-01.08-0000000002(CR)(LF)"    =>
"FB_DATA→-----→12.0(CR)(LF)"    =>
"FB_ENDE(CR)(LF)"    =>

```

```

<= "FB_LOAD_STARTED-01.08(CR)(LF)"
<= "FBQU_GRUND→XX-X(CR)(LF)"
<= "FBQU_DATA→X----- (CR)(LF)"
<= "FBQU_BLOECKE→1X→2X→3-(CR)(LF)"

```

2.3 Resetting the counters

The instruction "FB_COUNTER_DEL(CR)(LF)" serves for setting the counters of the current article to null (zero). The checkweigher acknowledges the deletion with "FB_OK(CR)(LF)".

2.4 Changing the current article

The external computer can activate another article for weighing i. e. change the current article of the checkweigher. The computer sends the instruction "FB_AR_WECHSEL~vvvvvvvvv(CR)(LF)" to the checkweigher, with vvvvvvvvv being the name of the article to be activated.

The external computer cannot change the current article when the article data screens have been called up i. e. when the weighing terminal is in the article editing mode; in this case the checkweigher sends "FB_ERR_EDIT(CR)(LF)" back to the computer. The normal case is that the checkweighers looks for the stated article in its memory. If the article cannot be found, the checkweigher sends the error message "FB_ERR_AR_NOT_FOUND(CR)(LF)" to the external computer; but if the article is found in the checkweigher's memory, the change of article takes place just like when released by hand, this means that a "final evaluation" may be released. Then a message is sent to the external computer in order to confirm that the change of article has been successfully effected:
"FB_WECHSEL_OK(CR)(LF)"

2.5 Requesting a final evaluation (daily report)

(Possible as of GARECO 01.03)

This instruction is activated only if the checkweigher is equipped with the optional 'statistics program'.

The instruction "FB_TAGES_ENDE(CR)(LF)" releases the final evaluation of the current article. The data of the 'total statistics' result will be printed out and then all counters will be reset i. e. recorded data be erased.

The weighing terminal sends back the message "FB_OK(CR)(LF)". It is recommended that the statistical data be inquired immediately before this instruction, as the old counter levels are not available anymore after the final evaluation.

2.6 Erasing an article

The external computer can erase an article from the checkweigher's memory. This is effected by means of the instruction "FB_LOESCHEN~vvvvvvvvv(CR)(LF) with vvvvvvvvv being the name of the article to be erased.

The external computer cannot erase any article when the article data screens have been called up i. e. when the weighing terminal is in the article editing mode; in this case the checkweigher sends "FB_ERR_EDIT(CR)(LF)" back to the computer. The normal case is that the checkweighers looks for the stated article in its memory. If the article cannot be found, the checkweigher sends the error message "FB_ERR_AR_NOT_FOUND(CR)(LF)" to the external computer; but if the article is found in the checkweigher's memory, the erasure of the article takes place.

It is not possible to erase the current i. e. active article or an article which is the only article left in the checkweigher's memory; in this case the checkweigher sends the error message "FB_ERR_AR_IN_PROCESS".

When the erasure of the article has taken place, the message "FB_DEL~vvvvvvvvv~DELETED(CR)(LF)" (with vvvvvvvvv being the article name) is sent to the external computer in order to confirm that the erasure has been successfully effected. If the checkweigher is equipped with the optional statistics program, a final evaluation of the article concerned will be released.

Summary:

Instructions: FB_LOESCHEN~vvvvvvvvv(CR)(LF)

Messages: FB_ERR_AR_IN_PROCESS(CR)(LF)
FB_ERR_AR_NOT_FOUND(CR)(LF)
FB_ERR_EDIT(CR)(LF)
FB_DEL~vvvvvvvvv~DELETED(CR)(LF)

2.7 Setting general parameters

2.7.1 Production legislation (tolerance system) of the statistics program

Instruction: "FB_SET_TOLSYST→X(CR)(LF)", with X being 0 or 1 or 2:

| | |
|-------|--|
| "X" | tolerance system (production legislation) |
| ----- | |
| 0 | free |
| 1 | EC- (EG-) |
| 2 | US (this exists only in checkweighers of the "S" and "E" series) |

Message: "FB_OK(CR)(LF)"

2.7.2 "Plus to good" classification/sorting (overweights classified as 'good')

Instruction "FB_SET_PGS→X(CR)(LF)", with X being 0 or 1:

| | |
|-------|--------------|
| "X" | PLUS to GOOD |
| ----- | |
| 0 | off |
| 1 | on (enabled) |

Message: "FB_OK(CR)(LF)"

2.7.3 Delay (waiting time)

(Possible as of GARECO 01.03)

Instruction "FB_SET_PAUSE→XXX(CR)(LF)", with X being the waiting time in milliseconds between the transmission of two data blocks.

Message: "FB_OK(CR)(LF)"

2.7.4 Date and time

(Possible as of GARECO 01.05)

Instruction "FB_SET_DATE→dd.mm.yyyy(CR)(LF)" serves for setting the date (day/month/year).

Instruction "FB_SET_TIME→hh.mm(CR)(LF)" serves for setting the time (hour/minute).

Message: "FB_OK(CR)(LF)"

2.7.5 Handshake protocols

(Possible as of GARECO 01.07)

Instruction "FB_SET_HS→X¹→X²(CR)(LF)",
with

| "X¹" | Protocol type |
|------|-----------------------|
| 0 | function switched off |
| 1 | CTS RTS |
| 2 | DTR DSR |
| 3 | Xon Xoff |

| "X²" | Mode |
|------|---------|
| 0 | passive |
| 1 | active |

Message "FB_OK(CR)(LF)"

In the "active" mode the checkweigher itself sets signals when reaching the limit of the receive buffer; in "passive" mode it does not.

2.7.6 Automatic sending of the 'production hour' results

(Possible as of GARECO 01.08)

Instruction "FB_SET_AUTOHOUR→X(CR)(LF)",
with

| "X" | Transmission |
|-----|-----------------------|
| 0 | function switched off |
| 1 | function switched on |

Message "FB_OK(CR)(LF)"

This instruction makes sense only when the checkweigher is configured with the "statistics program" (switched on). When the function is switched on the checkweigher automatically transmits the block "FB_PD_HOUR" (see below) in the moment when the current product hour is completed in the statistics program. This function is always switched off when the checkweigher is started (power-up).

2.8 Inquiry of the production data

The external computer can inquire the production data of the current i. e. active article or of another article. Two instructions exist for this purpose:

"FB_PD→+ABC ... (CR)(LF)" for inquiring the production data of the current i. e. active article,

"FB_PD→vvvvvvvvv→+ABC ... (CR)(LF)" for inquiring the production data of the article vvvvvvvvv (provided that this article exists in the checkweigher's memory).

If the stated article cannot be found, the checkweigher sends the error message "FB_ERR_AR_NOT_FOUND(CR)(LF)" to the external computer.

Similar to the article data, the production data of an article are also separated in several transmission blocks:

| ID mark: | Block: |
|----------|--|
| ----- | ----- |
| "A" : | "FB_PD_PLUS", with the data of the PLUS zones (overweights) |
| "B" : | "FB_PD_GUT", with the data of the GOOD zone |
| "C" : | "FB_PD_MINUS", with the data of the MINUS zone |
| "D" : | "FB_PD_STAT", with the total statistics data |
| "E" : | "FB_PD_AKTINT", with the data of the current statistics interval |
| "F" : | "FB_PD_LASTINT", with the data of the last completed statistics interval |
| "G" : | "FB_PD_14", with the data of the Mettler 14-zones-distribution |
| "H" : | "FB_PD_CHARGE", with the data of the current batch |
| "I" : | "FB_PD_LASTCHR", with the data of the last completed batch |
| "J" : | "FB_PD_HOUR", with the data of the production hour (as of GARECO 01.08) |

By means of the characters "+ABC" it can be stated which blocks are to be transmitted.

"FB_PD→+BD(CR)(LF)" will start the transmission of the blocks "FB_PD_GUT" and "FB_PD_STAT".

"FB_PD→+ABCDEFGHJIJ(CR)(LF)" will release the transmission of all 10 blocks (this can also be done using "FB_PD→+*(CR)(LF)").

NOTE: The blocks "D" to "J" can be transmitted only if the checkweigher is configured with the statistics program.

| Data | Meaning | Type |
|----------------------|---|-------|
| ----- | ----- | ----- |
| FB_PD_PLUS→ | block identification of the PLUS zones' counters | |
| XXXXXXXX→ | number of products (pcs.) in the PLUS 3 zone | long |
| XXXXXXXX→ | total weight of the products in the PLUS 3 zone | float |
| XXXXXXXX→ | mean value of the products in the PLUS 3 zone | float |
| XXXXXXXX→ | number of products (pcs.) in the PLUS 2 zone | long |
| XXXXXXXX→ | total weight of the products in the PLUS 2 zone | float |
| XXXXXXXX→ | mean value of the products in the PLUS 2 zone | float |
| XXXXXXXX→ | number of products (pcs.) in the PLUS 1 zone | long |
| XXXXXXXX→ | total weight of the products in the PLUS 1 zone | float |
| XXXXXXXX | mean value of the products in the PLUS 1 zone | float |
| (CR)(LF) | block termination | |
| total: 93 characters | | |
| ----- | ----- | ----- |
| FB_PD_GUT→ | block identification of the GOOD zones' counters | |
| XXXXXXXX→ | number of products (pcs.) in the GOOD zone | long |
| XXXXXXXX→ | total weight of the products in the GOOD zone | float |
| XXXXXXXX→ | mean value of the products in the GOOD zone | float |
| XXXXXXXX | number of products (pcs.) in the SPECIAL zone | long |
| →XXXXXXXX | number of METAL products ¹ (pcs.) that were detected | long |
| (CR)(LF) | block termination | |
| total: 47 characters | ¹ (56 characters – only in case of optional "metal detection") | |

| Data | Meaning | Type |
|----------------------|---|-------|
| FB_PD_MINUS→ | block identification of the MINUS zones' counters | |
| XXXXXXXX→ | number of products (pcs.) in the MINUS 1 zone | long |
| XXXXXXXX→ | total weight of the products in the MINUS 1 zone | float |
| XXXXXXXX→ | mean value of the products in the MINUS 1 zone | float |
| XXXXXXXX→ | number of products (pcs.) in the MINUS 2 zone | long |
| XXXXXXXX→ | total weight of the products in the MINUS 2 zone | float |
| XXXXXXXX→ | mean value of the products in the MINUS 2 zone | float |
| XXXXXXXX→ | number of products (pcs.) in the MINUS 3 zone | long |
| XXXXXXXX→ | total weight of the products in the MINUS 3 zone | float |
| XXXXXXXX | mean value of the products in the MINUS 3 zone | float |
| (CR)(LF) | block termination | |
| total: 94 characters | | |

| Data | Meaning | Type |
|-----------------------|--|-------|
| FB_PD_STAT→ | block identification of production data 'total statistics' | |
| XXXXXXXXXX→ | date | char |
| XXXXX→ | time | char |
| XXXXXXXXXX→ | article name | char |
| XXXXXXXXXX→ | batch number | char |
| XXXXXXXX→ | nominal weight | float |
| XXXXXXXX→ | tare | float |
| XXXXXXXX→ | number of 'good' products | long |
| XXXXXXXX→ | number of rejected products | long |
| XXXXXXXX→ | mean value | float |
| XXXXXXXX→ | standard deviation | float |
| XXXXXXXX→ | TU1 limit | float |
| XXXXXXXX→ | number of products < TU1 limit | long |
| XXXXXXXX→ | products below TU1 in per cent (TU1 infringement %) | float |
| XXXXXXXX→ | TU2 limit | float |
| XXXXXXXX | number of products < TU2 limit | long |
| (CR)(LF) | block termination | |
| total: 150 characters | | |

NOTE: The value "checked products" shown by the display of the weighing terminal must be calculated here by adding the number of "good products" to the number of "rejected products".

| Data | Meaning | Type |
|-----------------------|--|-------|
| FB_PD_AKTINT↵ | block identification of production data 'current interval statistics' | |
| XXXXXXXXXX↵ | date | char |
| XXXXX↵ | time | char |
| XXXXXXXXX↵ | number of 'good' products | long |
| XXXXXXXXX↵ | number of rejected products | long |
| XXXXXXXXX↵ | mean value | float |
| XXXXXXXXX↵ | standard deviation | float |
| XXXXXXXXX↵ | TU1 limit | float |
| XXXXXXXXX↵ | number of products < TU1 limit | long |
| XXXXXXXXX↵ | products below TU1 in per cent (TU1 infringement %) | float |
| XXXXXXXXX↵ | TU2 limit | float |
| XXXXXXXXX | number of products < TU2 limit | long |
| (CR)(LF) | block termination | |
| total: 112 characters | | |

| Data | Meaning | Type |
|-----------------------|---|------|
| FB_PD_LASTINT↵ | block identification of production data 'last interval statistics' | |
| ... | – see above "FB_PD_AKTINT↵" | |
| (CR)(LF) | block termination | |
| total: 113 characters | | |

| Data | Meaning | Type |
|-----------------------|---|------|
| FB_PD_14↵ | block identification of 14-zones-distribution | |
| XXXXXXXXX↵ | number of products in zone 1 | long |
| XXXXXXXXX↵ | number of products in zone 2 | long |
| XXXXXXXXX↵ | number of products in zone 3 | long |
| XXXXXXXXX↵ | number of products in zone 4 | long |
| XXXXXXXXX↵ | number of products in zone 5 | long |
| XXXXXXXXX↵ | number of products in zone 6 | long |
| XXXXXXXXX↵ | number of products in zone 7 | long |
| XXXXXXXXX↵ | number of products in zone 8 | long |
| XXXXXXXXX↵ | number of products in zone 9 | long |
| XXXXXXXXX↵ | number of products in zone 10 | long |
| XXXXXXXXX↵ | number of products in zone 11 | long |
| XXXXXXXXX↵ | number of products in zone 12 | long |
| XXXXXXXXX↵ | number of products in zone 13 | long |
| XXXXXXXXX↵ | number of products in zone 14 | long |
| (CR)(LF) | block termination | |
| total: 137 characters | | |

| Data | Meaning | Type |
|-----------------------|---|-------|
| FB_PD_CHARGE→ | block identification of production data 'current batch statistics' | |
| XXXXXXXXXX→ | date | char |
| XXXXX→ | time | char |
| XXXXXXXXXX→ | batch number | char |
| XXXXXXXX→ | number of 'good' products | long |
| XXXXXXXX→ | number of rejected products | long |
| XXXXXXXX→ | mean value | float |
| XXXXXXXX→ | standard deviation | float |
| XXXXXXXX→ | TU1 limit | float |
| XXXXXXXX→ | number of products < TU1 limit | long |
| XXXXXXXX→ | products below TU1 in per cent (TU1 infringement %) | float |
| XXXXXXXX→ | TU2 limit | float |
| XXXXXXXX | number of products < TU2 limit | long |
| (CR)(LF) | block termination | |
| total: 123 characters | | |

| Data | Meaning | Type |
|-----------------------|--|------|
| FB_PD_LASTCHR→ | block identification of production data 'last batch statistics' | |
| ... | same as FB_PD_CHARGE | |
| (CR)(LF) | block termination | |
| total: 124 characters | | |

| Data | Meaning | Type |
|-----------------------|---|------|
| FB_PD_HOUR→ | block identification of production data 'current production hour statistics' | |
| ... | same as FB_PD_STAT | |
| (CR)(LF) | block termination | |
| total: 150 characters | | |

After sending the requested blocks, the checkweigher sends a termination block which is "FB_ENDE(CR)(LF)" to inform the external computer that the transmission will end now.

2.9 Inquiry of the hourly records

(Possible with GARECO 01.03 and higher)

The records of the last 24 production hours of every article are stored in the weighing terminal and can be inquired.

Two instructions exist for this purpose:

"FB_ABLAGEN(CR)(LF)" inquires the recorded data of the current article.

"FB_ABLAGEN(CR)(LF)~vvvvvvvvv" inquires the recorded data of the article vvvvvvvvvv (provided that this article exists in the weighing terminal). If this article cannot be found, the weighing terminal sends the error message "FB_ERR_AR_NOT_FOUND(CR)(LF)" instead.

As a response to the request, the weighing terminal sends the following block, up to max. 24 times:

| Data | Meaning | Type |
|----------------------|---|---------------------------------------|
| FB_ABL~ | block identification of hourly records | |
| XX~ | current number | int |
| XXXX~ | time of beginning | char |
| XXXXXXXX~ | date of beginning | char |
| XXXX~ | time of end | char |
| XXXXXXXX~ | date of end | char |
| XXXXXXXX~ | throughput | long |
| XXXXXXXX~ | mean value | float |
| XXXXXXXX | TU1 % (percentage of TU1 infringements) | float (only if optional 'statistics') |
| CR)(LF) | block termination | |
| total: 68 characters | | |

After sending the requested hourly records, the checkweigher sends the string "FB_ABL_ENDE(CR)(LF)".

Should the string "FB_ABL_ENDE(CR)(LF)" be immediately sent (without recorded data), this means that no hourly records exist i. e. no data was stored yet.

2.10 Inquiry of the filling heads

(Possible with GARECO 01.04 and higher)

The data of the "filling head test" stored in the weighing terminal can be inquired. The instruction that exists for this purpose is:

"FB_FILLHEADS(CR)(LF)". As a response to the request, the weighing terminal sends the following block for every filling head:

| Data | Meaning | Type |
|----------------------|---|-------|
| FB_FH~ | block identification of 'filling head test' | |
| XX~ | current number | int |
| XXXXXXXX~ | mean value (average) | float |
| XXXXXXXX~ | standard deviation | float |
| XXXXXXXX~ | minimum | float |
| XXXXXXXX | maximum | float |
| CR)(LF) | block termination | |
| total: 46 characters | | |

After sending the requested 'filling head' data, the checkweigher sends the string "FB_FH_ENDE(CR)(LF)".

2.11 GARECO in a network

(Possible as of GARECO 01.05; with RS485 as of GARECO 01.07)

An individual machine number can be allocated to every checkweigher. GARECO uses such a machine number to check incoming instructions for the correct "addressee". And GARECO also marks outgoing responses with the machine number, to give the host an identification of the "sender".

In order to maintain the compatibility with the previous GARECO versions, GARECO will answer with its own address only when the instruction received from the host contained an address, too. When GARECO receives an instruction with an address (like in versions before this one) then the answer will be sent without an identification of the sender.

Example (using the instruction "FB_INFO(CR)(LF)":

```
"<123<FB_INFO-(CR)(LF)"
```

All checkweighers that receive this instruction compare the address (123) with their machine numbers entered by the operator. When the machine number of a checkweigher is identical with the address received GARECO will add its own address to the answer and reply ">123>FB_INF 55555 S(CR)(LF)". Any checkweigher the machine number of which is not identical with this address (i. e. if there is no match) will not answer.

Hardware prerequisite for GARECO in a network:

The correct functioning can be ensured only if all network participants are equipped with RS485 interfaces and all checkweighers use different machine numbers.