

Withdrawn; however may be applied on special agreement !

**EUROMAP
15**

**PROTOCOL FOR COMMUNICATION BETWEEN INJECTION
MOULDING MACHINES AND A CENTRAL COMPUTER**

Part 4

VARIABLE TRANSFER

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This recommendation was prepared by the Working Group "Electronic Control of Injection Moulding Machines" of EUROMAP.

It is part of the complete EUROMAP 15 recommendation.

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1. Introduction

Part 4 of the EUROMAP 15 recommendation, variable transfer, defines the telegrams and data structures necessary to transfer single variables or variable arrays from the machine controller to the central computer (variable upload) and from the central computer back to the machine controller (variable download).

At this time the telegrams and the communication flow for variable transfer are defined, but the designation, the length and the units of the variables are defined by the manufacturer, not by EUROMAP. In the near future EUROMAP will specify also the characteristics of the variables in order to assure full compatibility among different manufacturers also in the scope of variable transfer.

2. Types of Telegrams

2.1 Definition of Telegrams from the Central Computer

Telegram 030: REQUEST FOR VARIABLE SPECIFICATION
contains no data bytes

Telegram 031: SPECIFICATION OF UPLOAD VARIABLES

| Byte | cont. | Description |
|--------|-------|---|
| 05..09 | -A05- | variable designation of first variable |
| 10..14 | -A05- | variable designation of second variable |
| 15..19 | -A05- | variable designation of third variable |
| 20..24 | -A05- | variable designation of fourth variable |
| 25..29 | -A05- | variable designation of fifth variable |
| xx..44 | -Axx- | unused bytes filled with ASCII blank (20 hex) |

Telegram 032: DOWNLOAD VARIABLES AND SPECIFICATIONS

| Byte | cont. | Description |
|--------|-------|---|
| 05..09 | -A05- | variable designation of first variable |
| 10 | -A01- | length code of first variable |
| 11..xx | -Axx- | variable value of first variable |
| xx..xx | -A05- | variable designation of second variable |
| xx | -A01- | length code of second variable |
| xx..xx | -Axx- | variable value of second variable |
| ... | | |
| xx..xx | -A05- | variable designation of fifth variable |
| xx | -A01- | length code of fifth variable |
| xx..xx | -Axx- | variable value of fifth variable |
| xx..44 | -Axx- | unused bytes filled with ASCII blank (20 hex) |

Remark: The max. length of a variable is 34 characters. The length code is defined:

| length | code |
|--------|--------|
| 1 | 31 hex |
| 2 | 32 hex |
| ... | |
| 34 | 52 hex |

Remark: If the value of a variable is not valid it is filled with "#" (23 hex). If a variable does not exist the variable designation is the same as sent by telegram "031", the length code is "%" (25 hex) and the variable value is one byte long and filled with ASCII blank (20 hex).

Telegram 034: VARIABLES TRANSFER ACKNOWLEDGEMENT

| Byte | cont. | Description |
|------|-------|-----------------|
| 05 | -N01- | acknowledgement |
| | "0" | - negative |
| | "1" | - positive |

2.2 Extension of the List with Standard Answers

Telegram 100: STANDARD ANSWER

| Byte | cont. | Description |
|--------|-------|--------------------------------------|
| 05..07 | -N03- | request number |
| | "030" | - request for variable specification |

2.3 Definitions of Telegrams from the Machine Controller

Telegram 131: UPLOAD VARIABLES AND SPECIFICATIONS

| Byte | cont. | Description |
|--------|-------|---|
| 05..09 | -A05- | variable designation of first variable |
| 10 | -A01- | length code of first variable |
| 11..xx | -Axx- | variable value of first variable |
| xx..xx | -A05- | variable designation of second variable |
| xx | -A01- | length code of second variable |
| xx..xx | -Axx- | variable value of second variable |
| ... | | |
| xx..xx | -A05- | variable designation of fifth variable |
| xx | -A01- | length code of fifth variable |
| xx..xx | -Axx- | variable value of fifth variable |
| xx..44 | -Axx- | unused bytes filled with ASCII blank (20 hex) |

Remark: The max. length of a variable is 34 characters. The length code is defined:

| length | code |
|--------|--------|
| 1 | 31 hex |
| 2 | 32 hex |
| ... | |
| 34 | 52 hex |

Remark: If the value of a variable is not valid it is filled with "#" (23 hex). If a variable does not exist the variable designation is the same as sent by telegram "031", the length code is "%" (25 hex) and the variable value is one byte long and filled with ASCII blank (20 hex).

Telegram 132: SPECIFICATION OF DOWNLOAD VARIABLES

| Byte | cont. | Description |
|--------|-------|---|
| 05..09 | -A05- | variable designation of first variable |
| 10..14 | -A05- | variable designation of second variable |
| 15..19 | -A05- | variable designation of third variable |
| 20..24 | -A05- | variable designation of fourth variable |
| 25..29 | -A05- | variable designation of fifth variable |
| xx..44 | -Axx- | unused bytes filled with ASCII blank (20 hex) |

Telegram 134: VARIABLES TRANSFER ACKNOWLEDGEMENT

| Byte | cont. | Description |
|------|-------|---|
| 05 | -N01- | function acknowledgement |
| | "0" | - negative |
| | "1" | - positive (able to accept download) |
| 06 | -N01- | download acknowledgement of first variable |
| | "0" | - not accepted |
| | "1" | - accepted |
| | "2" | - variable not existing |
| 07 | -N01- | download acknowledgement of second variable |
| | "0" | - not accepted |
| | "1" | - accepted |
| | "2" | - variable not existing |
| 08 | -N01- | download acknowledgement of third variable |
| | "0" | - not accepted |
| | "1" | - accepted |
| | "2" | - variable not existing |
| 09 | -N01- | download acknowledgement of fourth variable |
| | "0" | - not accepted |
| | "1" | - accepted |
| | "2" | - variable not existing |
| 10 | -N01- | download acknowledgement of fifth variable |
| | "0" | - not accepted |
| | "1" | - accepted |
| | "2" | - variable not existing |

Remark: If less than 5 variables are downloaded the unused acknowledgement bytes must be filled with ASCII blank (20 hex).

3. Communication Flow**3.1 Upload of Variables Initiated by Central Computer**

| | | |
|------------------|--|--|
| "031"+spec. | | - request for upload of variables including specifications |
| "131"+spec.+data | | - upload variables including specifications and variables |

3.2 Download of Variables Initiated by Central Computer

| | | |
|------------------|--|--|
| "032"+spec.+data | | - download variables including specifications and variables, |
| "134"+"1xxxxx" | | - positive acknowledgement |
| or | | |
| "134"+"0xxxxx" | | - negative acknowledgement |

3.3 Upload of Variables Initiated by Machine Controller

| | | |
|------------------|--|---|
| "000" | | - standard question |
| "100"+"030" | | - standard answer with request for variable specification |
| "030" | | - request for variable specification |
| "131"+spec.+data | | - upload variables including specifications and variables |
| "034"+"1" | | - positive acknowledgement |
| or | | |
| "034"+"0" | | - negative acknowledgement |
| "134"+"1" | | - positive acknowledgement |
| or | | |
| "134"+"0" | | - negative acknowledgement |

3.4 Download of Variables Initiated by Machine Controller

| | |
|------------------|--|
| "000" | - standard question |
| "100"+"030" | - standard answer with request for variables specification |
| "030" | - request for variable specification |
| "132"+spec. | - request for download of variables including specifications |
| "032"+spec.+data | - download variables including specifications and variables |
| "134"+"1xxxxx" | - positive acknowledgement |

3.5 Error Detection

If the sequence of telegrams is not as specified, then the telegrams "096" or "196" must be used.

If the slave receives telegram "030" although it did not send a standard answer "100"+"030", it will send "196".

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