

**Withdrawn; however may be applied on special agreement !**

**EUROMAP  
15**

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

**Part 8**

**ATTRIBUTE DATA TRANSFER FOR STATISTICAL  
PROCESS CONTROL ( SPC )**

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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 8 of the EUROMAP 15 recommendation, attribute data transfer for statistical process control (SPC), defines the telegrams and data structures necessary to collect attribute data from the machine controller required to perform statistical process control or any other data evaluation on the central computer.

All attribute data is created on the machine controller by using information: manually entered by the operator or automatically entered by special automatic quality peripheral devices such as vision system, go/no-go gage, etc.

Euromap does not define a method to SPC in the machine controller, it defines only a means to transfer SPC related data from the machine controller to the central computer. In addition to the implementation of EUROMAP 15 part 8 any machine controller may or may not contain an internal manufacturer specific SPC system.

The telegrams are universally defined to allow collecting any kind of attribute related data such as uncompleted, contaminated, burned, etc., part.

The central computer can perform any data evaluation of interest going beyond SPC.

## 2. Types of Telegrams

### 2.1 Definition of Telegrams from the Central Computer

Telegram 250:		SET DATA COLLECTION MODE
Byte	cont.	Description
05..07	-N03-	sample size ("001" to "999")
08	-N01-	sampling mode; start of sample
	"1"	on cycle number
	"2"	on time
	"3"	at the end of previous sample
	"4"	on request from the central computer
09..14	-N06-	number of cycles between start of samples only if sampling mode = 1
15..20	-N06-	time delay between start of samples in seconds; only if sampling mode = 2
21..22	-A02-	identification of requested chart: "P", "NP" blanks mean no chart requested
23..24	-A02-	identification of requested chart: "C", "U" blanks mean no chart requested

Remark:

The start of the sample can give a signal to the operator and/or the quality peripheral devices to collect parts for quality inspection, this signal is reset at the sample end.

Remark:

The formulas to be applied are:

- "P" value= no. of non-conforming parts / no. of parts inspected
- "NP" value= no. of parts not-conforming
- "C" value= no. of non-conformities
- "U" value= no. of non conformities / no. of parts inspected

These formulas must be implemented by the machine controller and the data is manually entered by the operator and/or automatically entered by quality peripheral devices.

Telegram 251:		SELECT ATTRIBUTES
Byte	cont.	Description
05	-N01-	number of attribute group ("0","1","2"....)
06	-N01-	(ASCII Blank)
07..08	-N02-	definition of attribute 1
09	-N02-	(ASCII Blank)
10..11	-N02-	definition of attribute 2
12	-N02-	(ASCII Blank)
13..14	-N02-	definition of attribute 3
15	-N02-	(ASCII Blank)
16..17	-N02-	definition of attribute 4
18	-N02-	(ASCII Blank)
19..20	-N02-	definition of attribute 5
21	-N02-	(ASCII Blank)
22..23	-N02-	definition of attribute 6
24	-N02-	(ASCII Blank)

Select a group of 6 attributes to be stored for reference from the central computer; the attribute number refers to a list of attribute descriptions stored in the machine controller; the attribute description can be stored by using variable transfer functions of EUROMAP 15, part 4; attributes are, normally, application dependent; attribute group 0 is used only for the telegram 354. In case of automatic collection of attributes by means of quality peripheral devices, the description field must contain information related to the EUROMAP 17 channel.

Telegram 252:		REMOTE CONTROL OF SAMPLING PROCESS
Byte	cont.	Description
05	-N01-	remote control command
	"1"	- start
	"2"	- suspend
	"3"	- continue
	"4"	- stop (reset and clear attribute definitions)
06..08	-N03-	- delay until start (cycles)
		only valid if byte 05 is "1" or "3" and sampling mode is not equal to 4
09..14	-N06-	start time of first sample, only valid if sampling mode is equal 2

**Telegram 253: TAKE SAMPLE (REQUEST FROM CENTRAL COMPUTER)**  
contains no data bytes

Remark: This telegram is only used if sampling mode = 4.

Telegram 254:		REQUEST FOR SAMPLED ATTRIBUTES
Byte	cont.	Description
05	-N01-	identification of attribute group
06..07	-A02-	identification of chart
	"P"	- proportion of not-conforming
	"NP"	- number of units not-conforming
	"C"	- number of non-conformities
	"U"	- number of non-conformities per unit

## 2.2 Extension of the List with Standard Answers

Telegram 100:		Standard Answer
Byte	cont.	Description
05..07	-N03-	request number
07	"254"	- request for sampled attributes

## 2.3 Definition of Telegrams from the Machine Controller

Telegram 350:		SPECIFICATION OF DATA COLLECTION MODE
Byte	cont.	Description
05..07	-N03-	sample size ("001" to "999")
08	-N01-	sampling mode; start of sample is
	"1"	- on cycle number
	"2"	- on time
	"3"	- at the end of previous sample
	"4"	- on request from the central computer
09..14	-N06-	number of cycles between start of samples; only used if sampling mode = 1
15..20	-N06-	time delay between start of samples inseconds; only used if sampling mode = 2

**Telegram 351: SPECIFICATION OF SELECTED ATTRIBUTES**

Byte	cont.	Description
05	-N01-	number of attribute group("1","2"...)
06	-N01-	status of the group:
	"0"	- group not available
	"1"	- group with selectable attributes
07..08	-N02-	definition of attribute 1
09	-N01-	status of attribute 1
	"0"	- attribute not available
	"1"	- attribute selected
10..11	-N02-	definition of attribute 2
12	-N01-	status of attribute 2
13..14	-N02-	definition of attribute 3
15	-N01-	status of attribute 3
16..17	-N02-	definition of attribute 4
18	-N01-	status of attribute 4
19..20	-N02-	definition of attribute 5
21	-N01-	status of attribute 5
22..23	-N02-	definition of attribute 6
24	-N01-	status of attribute 6

The attribute group number refers to a attribute description list stored in the machine controller; the attribute description list may be stored by using the variable transfer functions of EUROMAP 15, part 4; attribute definition equal to " " (2 ASCII blanks) means not selected; attribute definition is application dependent.

**Telegram 352: ANSWER TO "252"**

Byte	cont.	Description
05	-N01-	acknowledge
	"0"	- not possible, no reason specified
	"1"	- positive acknowledge
	"2"	- start command neglected (already running)
	"3"	- not possible to continue (not suspended)
	"4"	- not possible to suspend (already suspended)
	"5"	- not possible to suspend (not started)
	"6"	- start command neglected (not initialized)

Remark: In case any other nack reason is not applicable, the "0" can be used.

**Telegram 353: ANSWER TO "253"**

Byte	cont.	Description
05	-N01-	acknowledge
	"1"	- ok, sample started
	"2"	- sample start not possible (buffer full)
	"3"	- sample start not possible (wrong mode)
	"4"	- sampling in progress, sample start not possible

Telegram 354:		SAMPLED ATTRIBUTES
Byte	cont.	Description
05	-N01-	identification of attribute group
06..07	-A02-	identification of chart
	"P"	- proportion of not-conforming
	"NP"	- number of units not-conforming
	"C"	- number of non-conformities
	"U"	- number of non-conformities per unit
08..13	-N06-	value of attribute 1
14..19	-N06-	value of attribute 2
20..25	-N06-	value of attribute 3
26..31	-N06-	value of attribute 4
32..37	-N06-	value of attribute 5
38..43	-N06-	value of attribute 6
<p>Remark: If attribute group 0 is requested, then the selection of the attributes is fixed. Bytes 06 to 07 have to contain "00", otherwise "355" with "4" is sent.  attribute 1 = no. of lots completed (6 MSD's)  attribute 2 = no. of lots completed (6 LSD's)  attribute 3 = actual no. of parts within last lot (6 MSD's)  attribute 4 = actual no. of parts within last lot (6 LSD's)  attribute 5 = date (ddmmyy)  attribute 6 = time (hhmmss)  These values are referred to the first cycle of the sample.</p>		
<p>Remark: Before entering the input data the machine controller must be informed about the inherent sample: i.e. the first cycle number of the sample, because the data being entered can be related to a different from the actual sample.</p>		
<p>Remark: Values of unused attributes are filled with ASCII blank.</p>		
<p>Remark: Not consistent value of an attribute is filled with: ##### .</p>		
Telegram 355:		ANSWER TO "254" (NACK)
Byte	cont.	Description
05	-N01-	not acknowledge
	"0"	- not possible, no reason specified
	"1"	- system not initialized
	"2"	- sampling process not running
	"3"	- sample buffer empty
	"4"	- requested attribute group not available
	"5"	- requested attribute group not stored
<p>Remark: In case any other nack reason is not applicable, the "0" can be used.</p>		

**Telegram 356: ANSWER TO "250" and "251" (NACK)**

Byte	cont.	Description
05	-N01-	not acknowledge
	"0"	- not possible, no reason specified
	"1"	- system already running

Remark: In case any other nack reason is not applicable, the "0" can be used.



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