European Plastics and Rubber Machinery

EUROMAP 75-1	Protocol for Communication with Peripheral Equipment **Device Profile for Measuring Amplifiers**

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20 pages

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www.euromap.org

EUROMAP Technical Commission
c/o VDMA • FV KuG

Lyoner Str. 18
DE 60528 Frankfurt am Main

Phone + 49 (69) 6603-1833
Fax + 49 (69) 6603-2833
E-Mail:euromap@vdma.org

History

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May 2010	Document published
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1 Introduction

Please note:

When applying EUROMAP 75 please check in your quotation or machine documentation, if there is marked which Ethernet System is used for the device profile.

1.1 Purpose

This document describes the profile for EUROMAP 75 measuring amplifiers.

1.2 Scope

The EUROMAP 75 specification is divided into a general description, the device profile, a definition of the interface between the injection moulding machines and signal converters and the implementation of different realtime Ethernet Systems. The present part of document is a general description and describes the device profile.

The device profile is based on the “CANopen Device Profile for Measuring Devices and Closed-Loop Controllers (CiA 404)" and is supplemented by the definitions of industrial realtime Ethernet including the specific requirements for these device categories.
The electrical interface comprises the definition of the plug connections, the "physical layer" and the wiring concept on the basis of a realtime Ethernet bus.

This document is intended for engineers who are concerned with the implementation of this interface. A basic knowledge of CANopen is prerequisite to understand the document.

1.3 Definitions, acronyms and abbreviations

AL	alarm
AI	analog input
CANopen	Communication profiles (CiA 301) and device profiles (CiA 40x), standardized by CiA.
CiA	CAN in Automation. Organization responsible for the definition of different CAN protocols, a.o. CAN Application Layer (CAL) and CANopen (http://www.can-cia.de/).
const	constant
EUROMAP	European Committee of Manufacturers of Plastics and Rubber Machinery (http://www.euromap.org/).
M	mandatory
ms	manufacturer-specific
O	optional
ro	read-only
rw	read/write
wo	write-only

1.4 References

Short name	Title	Version	Issued by
EUROMAP 75	EUROMAP 75-2 "Protocol for Communication with Peripheral Equipment" - Demands on EUROMAP 75 Devices" EUROMAP 75-3 "Protocol for Communication with Peripheral Equipment" - Implementation of Different Realtime Ethernet Systems"	1.2 1.3	EUROMAP
CiA 102	CAN Physical Layer for Industrial Applications	3.0	CiA
CiA 301	CANopen Application Layer and Communication Profile	4.2	CiA
CiA 404	Device Profile for Measuring Devices and closed-loop controllers	2.0	CiA
CiA 303-2	Representation of SI Units and Prefixes	1.4	CiA

1.5 Document Overview

This document is divided into:

- General Device Description mandatory
- Analog Input Function Block mandatory
- Alarm Function Block optional

The Analog Input Function Block and the Alarm Function Block shall be compliant to CiA 404.

Textual characters are represented in Unicode UTF8 format!

2 General Device Description

Index	Object	Description	PDO Mapping	Master (machine)	Slave (device)	
6E00h	VAR	EUROMAP75_Device_Profile	no	M	M	EUROMAP Device Profile

2.1 EUROMAP 75 Device Profile

This object defines the EUROMAP device profile.

Index	Sub-Index	Name	Data type	Access	Default value	Value range
6E00h	0	EUROMAP75_Device_Profile	Unsigned32	const	01 02 01 4Bh	

MSB			LSB
Profile Version	Profile Index	EUROMAP75-Profile Code	EUROMAP75 Code

EUROMAP75-Code: 75 (4Bh)

The EUROMAP75-Profile Code for measuring amplifiers with analogue input block: Bit 0 = 1.
The EUROMAP75-Profile Code for measuring amplifiers with alarm block: Bit 1 = 1.

Profile version and index correspond to the version of the device profile document for measuring amplifiers.
For example:

Document Version 1.0: Profile Version 01h and Profile Index 00h
Document Version 3.4: Profile Version 03h and Profile Index 04h
etc.

3 Analog Input Function Block

The following table shows a list of objects, applied in the Analog Input Function Block; the Arrays support 1 to 128 channels.

Index	Object	Name	PDO Mapping	Master (machine)	Slave (device)
61E0h	VAR	AI number of channels	No	M	M
9130h	Array	AI input PV (Process Value)	Possible	M	M
61E1h	Array	AI sensor type list	No	M	M
6110h	Array	AI sensor type	Possible	M	M
61E2h	Array	AI auto detected sensor type	Possible	M	O
9126h	Array	AI scaling factor (auto detected)	Possible	M	O
6131h	Array	AI physical unit PV	Possible	O	O
6132h	Array	AI decimal digits PV	Possible	M	O
61E3h	Array	AI selected measuring range	Possible	M	M
6152h	Array	AI status word 2	Possible	M	M
6162h	Array	AI control word 2	Possible	M	M
611Eh	Array	AI time until data is valid	No	M	M
61E4h	Array	AI supported measuring ranges	No	M	M

3.1 AI number of channels

The object 61E0h provides the number of measuring channels of the device.

Index	Sub-Index	Name	Data type	Access	Default value	Value range
61E0h	00h	AI number of channels	Unsigned8	const	ms	01h to 80h

3.2 AI Input PV (Process Value)

This object represents the converted value of the analog input module, which is scaled to the physical unit.
A fixed scaling factor is used, see table below.

Index	Sub-Index	Name	Data type	Access	Default value	Value range
9130h	00h	Highest sub-index supported	Unsinged8	const	ms	01h to 80h (61E0h)
	01h	AI input process value 1	Integer32	ro	No	Integer32
	..	..	..	..	..	..
	80h	AI input process value 128	Integer32	ro	No	Integer32

3.3 AI sensor type list

The Object 61E1h provides the list of sensor types and features supported by the particular measuring channel.

Index	Sub-Index	Name	Data type	Access	Default value	Value range
61E1h	00h	Highest sub-index supported	Unsigned8	const	ms	01h to 80h (61E0h)
	01h	AI sensor type list 1	Unsigned32	const	ms	See list
	..	..	..	..	..	..
	80h	AI sensor type list 128	Unsigned32	const	ms	See list

Sensor Type List:

Bit 0 : 1 = Thermocouple type J
Bit 1 : 1 = Thermocouple type K
Bit 2 : 1 = Thermocouple type L
Bit 3 : 1 = Thermocouple type N
Bit 4-8 : reserved
Bit 9 : 1 = Piezoelectric
Bit 10 : 1 = Strain gauge resistor
Bit 11 : 1 = Strain gauge Piezo-resitive
Bit 12 : reserved
Bit 13 : 1 = Voltage
Bit 14 : 1 = Current
Bit 15 : 1 = General measuring system
Bit 16-18 : reserved
Bit 19 : 1 = Thermocouple type N, aso*
Bit 20 : 1 = Piezoelectric, aso*
Bit 21 : 1 = KTY
Bit 22 : 1 = PT100
Bit 23 : 1 = PT1000
Bit 24 : 1 = Flow
Bit 25 : 1 = Stroke
Bit 26 : 1 = Velocity
Bit 27 : reserved
Bit 28 : 1 = End of Cooling
Bit 29 : 1 = SLP Teach in
Bit 30 : 1 = Sensor Sensitivity Identification
Bit 31 : 1 = Sensor Type Identification
* aso = automatic switch-over function.

Example: Sensor Type List 61E1h = 0x0000 000F
This cannel supports thermo couples of type J, K, L, N – without automatic switch-over function.

3.4 AI sensor type

Object 6110h specifies the type of sensor, which is connected to the analog input.

Index	Sub-Index	Name	Data type	Access	Default value	Value range
6110h	00h	Highest sub-index supported	Unsigned8	const	ms	01h to 80h (61E0h)
	01h	AI sensor type 1	Unsigned16	rw	ms	See List
	..	..	..	..	..	..
	80h	AI sensor type 128	Unsigned16	rw	ms	See List

This specification is used when the measuring sensor is not automatically detected i.e. when no sensor identification is available or when a sensor without identification is used.

List of sensor type codes

Value	Description	Dimension
0000h	unknown (General measuring system)	Dimensionless
0001h	Thermocouple type J	0,001 °C / Bit
0002h	Thermocouple type K	0,001 °C / Bit
0003h	Thermocouple type L	0,001 °C / Bit
0004h	Thermocouple type N	0,001 °C / Bit
0027h (39d)	KTY	0,001 °C / Bit
001Eh (30d)	PT100	0,001 °C / Bit+
0021h (33d)	PT1000	0,001 °C / Bit
0028h (40d)	Voltage	0,001 mV / Bit
0032h (50d)	Current	0,001 mA / Bit
0045h (69d)	Flow	0,001 cm^3/s / Bit
0046h (70d)	Strain gauge	Dimensionless (0,001 µV/V / Bit)
004Ah (74d)	Strain gauge Piezo-resistive	Dimensionless (0,001 µV/V / Bit)
004Ch (76d)	Piezo-electric	0,001 pC / Bit
0058h (88d)	Length (Stroke)	0,100 µm / Bit
0059h (89d)	Velocity	0,100 µm/s / Bit

3.5 AI auto-detected sensor type

This object describes the automatically detected sensor type.

Index	Sub-Index	Name	Data type	Access	Default value	Value range
61E2h	00h	Highest sub-index supported	Unsigned8	const	ms	01h to 80h (61E0h)
	01h	AI auto-detected sensor type 1	Unsigned8	ro	No	See List
	..	..	..	..	..	..
	80h	AI auto-detected sensor type 128	Unsigned8	ro	No	See List

AI Auto-detected Sensor Type: a field value of 00h means “no sensor detected”
In this case the device operates with the specification from object 6110h Sensor Type.
For the ID numbers of the various sensor types, see list of sensor types at Object 6110h.

3.6 AI (auto-detected) scaling factor

This object describes the automatically detected sensor sensitivity.

Index	Sub-Index	Name	Data type	Access	Default value	Value range
9126h	00h	Highest sub-index supported	Unsigned8	const	ms	01h to 80h (61E0h)
	01h	AI scaling factor 1	Integer32	ro	0	Integer32
	..	..	..	..	..	..
	80h	AI scaling factor 128	Integer32	ro	0	Integer32

AI (auto-detected) scaling factor: a field value of 0 means “no sensor sensitivity detected”.

This value is only used for the automatic detection of the sensor sensitivity, and is not taken into consideration for the calculation of the input process value and the measuring ranges.

3.7 AI physical unit PV (scaling factor)

This object shall assign SI units and prefixes for the values of object 9126h within the analog input function block. The structure of the SI unit entry is as follows:

31 … 24	23 … 16	15 … 8	7 … 0
Prefix	*SI Numerator*	*SI Denominator*	*reserved*
MSB			LSB

The coding of the physical units and prefixes is done according to the CiA 303-2

Index	Sub-Index	Name	Data type	Access	Default value	Value range
6131h	00h	Highest sub-index supported	Unsigned8	const	ms	01h to 80h (61E0h)
	01h	AI physical unit 1	Unsigned32	rw	ms	CiA 404
	..	..	..	..	..	..
	80h	AI physical unit 128	Unsigned32	rw	ms	CiA 404

3.8 AI decimal digits PV (Scaling Factor)

This object describes the number of decimal digits following the decimal point for interpretation of data type Integer32 in object 9126h.
Example: A field value of 1.230 will be coded as 1230 Integer format if number of decimal digits is set to 3.

Index	Sub-Index	Name	Data type	Access	Default value	Value range
6132h	00h	Highest sub-index supported	Unsigned8	const	ms	01h to 80h (61E0h)
	01h	AI decimal digits PV 1	Unsigned8	rw	ms	00h *to* 09h
	..	..	..	..	..	..
	80h	AI decimal digits PV 128	Unsigned8	ro	ms	00h *to* 09h

3.9 AI selected measuring range

This object selects the measuring range of the channel as specified in Object 61E4h.

Index	Sub-Index	Name	Data type	Access	Default value	Value range
61E3h	00h	Highest sub-index supported	Unsigned8	const	ms	01h to 80h (61E0h)
	01h	AI selected measuring range 1	Unsigned8	rw	01h	01h *to* FFh
	..	..	..	..	..	..
	80h	AI selected measuring range 128	Unsigned8	rw	01h	01h *to* FFh

3.10 AI status word-2

This object provides status information.

Index	Sub-Index	Name	Data type	Access	Default value	Value range
6152h	00h	Highest sub-index supported	Unsigned8	const	ms	01h to 80h (61E0h)
	01h	AI status word-2 1	Unsigned16	ro	No	See below
	..	..	..	..	..	..
	80h	AI status word-2 128	Unsigned16	ro	No	See below

Value definition for AI status word-2:

Bit 0 : 1 = Input Process Value 9130h = invalid
Bit 1 : 1 = Input Process Value 9130h = pos. overload
Bit 2 : 1 = Input Process Value 9130h = neg. overload
Pos. or neg. overload does not indicate that the process value is invalid, it can be valid too.
Bit 3 : 1 = Reset active. If the reset impulse is too short, the channel prolongs the reset duration automatically
to the required time.
Bit 4 : 1 = ADC enable. This bit shows that sampling will start with the next sync signal when ADC busy is 0.
Bit 5 : 1 = ADC busy. This bit indicates that the channel is sampling, process value and Status Bits are the result from the last sampling. **
Bit 6 : 1 = Process signal "Automatic switch-over" (reset with control byte bit 6)
Bit 7 : 1 = Process signal "End of cooling time" (reset with control byte bit 7)
Bit 8 : 1 = SLP teach-in is active***
Bit 9 : 1 = simulation operating mode is active
Bit 10-11 : reserved
Bit 12 : 1 = sensor / cable break
Bit 13 : 1 = New sensor sensitivity detected (9126), reset by reading object 9126.
Bit 14 : 1 = New sensor type detected (61E2), reset by reading object 61E2.
Bit 15 : 1 = Configuration error (meas. range, sensor type etc.)

3.11 AI control word-2

This object is used to control some special behaviour of the measuring amplifier.

Index	Sub-Index	Name	Data type	Access	Default value	Value range
6162h	00h	Highest sub-index supported	Unsigned8	const	ms	01h to 80h (61E0h)
	01h	AI control word-2 1	Unsigned16	rw	ms	See below
	..	..	..	..	..	..
	80h	AI control word-2 128	Unsigned16	rw	ms	See below

Value definition for AI control word-2:

Bit 0..2 : reserved
Bit 3 : 1 = meas. channel reset / 0 = operate
The Reset can arbitrarily long, from one communication cycle up to a whole machine cycle. The channel stays for the duration of the rest signal in reset mode.
Bit 4 : 1 = ADC enable. This bit enables the start of a new sampling with the next sync signal when ADC busy is 0.**
0 = No new sampling with the next sync signal, the currently sampling is not affected.
Bit 5 : reserved
Bit 6 : 1 = process signal "automatic switch-over" handshake (status word bit 6)
Bit 7 : 1 = process signal "End of Cooling" handshake (status word bit 7)
Bit 8 : 1 = SLP teach-in start***
Bit 9 : 1 = simulation operating mode
Bit 10-15 : reserved

** ADC = analog-digital (a/d) converter
*** SLP teach-in start = Activating the "self-optimizing switching-point detection" teach-in function

3.12 AI time until PV is valid

The AI Time until PV is valid shall be given in ns.
This object defines the required time duration from the start of the measured value acquisition to the time at which the actual values are valid and available on the interface.

Index	Sub-Index	Name	Data type	Access	Default value	Value range
611Eh	00h	Highest sub-index supported	Unsigned8	const	ms	01h to 80h (61E0h)
	01h	Time until data is valid 1	Unsigned32	const	ms	Unsinged32
	..	..	..	..	..	..
	80h	Time until data is valid 128	Unsigned32	const	ms	Unsigned32

3.13 AI supported measuring ranges

List of supported measuring ranges.

Index	Sub-Index	Name	Data type	Access	Default value	Value range
61E4h	00h	Highest sub-index supported	Unsigned8	const	ms	01h to 80h (61E0h)
	01h	AI supported measuring ranges 1	Domain	ro	No	See below
	..	..	..	..	..	..
	80h	AI supported measuring ranges 128	Domain	ro	No	See below

Definition of the AI supported measuring ranges domain

The domain shall be structured as specified in the following table:

Name	Data type	Value range	Description
Number of entries	Unsigned8	1 *to* n	Number of groups of sensor types with identical measuring ranges
Sensor type list 1	Unsigned32	See 6110h	Group 1 of sensor types
Number of measuring ranges 1	Unsigned8	1 *to* a	Number of measuring ranges for group 1
Span 1 start	Integer32	Integer32	Measuring range 1 start for group 1
Span 1 end	Integer32	Integer32	Measuring range 1 end for group 1
..	..	..	..
Span a start	Integer32	Integer32	Measuring range a start for group 1
Span a end	Integer32	Integer32	Measuring range a end for group 1
Sensor type list 2	Unsigned32	See 6110h	Group 2 of sensor types
Number of measuring ranges 2	Unsigned8	1 *to* b	Number of measuring ranges for group 2
Span 1 start	Integer32	Integer32	Measuring range 1 start for group 2
Span 1 end	Integer32	Integer32	Measuring range 1 end for group 2
…		..	
Span b start	Integer32	Integer32	Measuring range b start for group 2
Span b end	Integer32	Integer32	Measuring range b end for group 2
…		..	
Sensor type list n	Unsigned32	See 6110h	Group n of sensor types
Number of measuring ranges n	Unsigned8	1 *to* x	Number of measuring ranges for group n
Span 1 start	Integer32	Integer32	Measuring range 1 start for group n
Span 1 end	Integer32	Integer32	Measuring range 1 end for group n
…		..	
Span x start	Integer32	Integer32	Measuring range x start for group n
Span x end	Integer32	Integer32	Measuring range x end for group n

The parameters “Sensor Type List 1 *to* n“ are defined according to the object Sensor Type List 61E1h.
For “Span x start” and “Span x end” the same scaling applies as for the Input Process Value (9130h).

Examples for the structure of the list: AI supported measuring ranges (object 61E4h)

Example 1: Measuring channel Piezoelectric, Piezoelectric with automatic switch over.

Name	Value	Description
Number of entries	01h	Number of groups of sensor types with identical measuring ranges
Sensor type list 1	0010 0200h	Group 1 of sensor types
Number of measuring ranges 1	02h	Number of measuring ranges for group 1
Span 1 start	0d	Measuring range 1 start
Span 1 end	+5.000.000d	Measuring range 1 end
Span 2 start	0d	Measuring range 2 start
Span 2 end	+20.000.000d	Measuring range 2 end

Example 2: Measuring channel temperature sensor J, K, L, N, N with automatic switch over.

Name	Value	Description
Number of entries	01h	Number of groups of sensor types with identical measuring ranges
Sensor type list 1	0008 000Fh	Group 1 of sensor types
Number of measuring ranges 1	01h	Number of measuring ranges for group 1
Span 1 start	0d	Measuring range 1 start
Span 1 end	+500.000d	Measuring range 1 end

Example 3: Two groups of Measuring channels
Group 1: Piezo-electric, Piezo-electric with automatic switch over
Group 2: temperature sensor J, K, L, N, N with automatic switch over

Name	Value	
Number of entries	02h	Number of groups of sensor types with identical measuring ranges
Sensor type list 1	0010 0200h	Group 1 of sensor types
Number of measuring ranges 1	02h	Number of meas. ranges for group 1
Span 1 start	0d	Measuring range 1 start
Span 1 end	+5.000.000d	Measuring range 1 end
Span 2 start	0d	Measuring range 2 start
Span 2 end	+20.000.000d	Measuring range 2 end
Sensor type list 2	0008 000Fh	Group 2 of sensor types
Number of measuring ranges 1	01h	Number of measuring ranges for group 2
Span 1 start	0d	Measuring range 1 start
Span 1 end	+500.000d	Measuring range 1 end

4 Alarm Function Block

The following table shows a list of objects, applied in the Alarm Function Block:

Index	Object type	Name	PDO Mapping	Master (machine)	Slave (device)
6503h	Array	AL 1 link input	No	M	M
6505h	Array	AL 1 link alternate input	No	O	O
6508h	Array	AL 1 type	No	M	M
950Ah	Array	AL 1 level	No	M	M
950Bh	Array	AL 1 hysteresis	No	O	O
650Ch	Array	AL 1 group OR	No	O	O
650Dh	Array	AL 1 state	Possible	M	M
650Eh	Array	AL 1 reset	No	M	M
::::::	::::::	Objects 651xh, 652xh ... 657xh are defined similarly.	::::::	::::::	::::::
6573h	Array	AL 8 link input	No	M	M
6575h	Array	AL 8 link alternate input	No	O	O
6578h	Array	AL 8 type	No	M	M
957Ah	Array	AL 8 level	No	M	M
957Bh	Array	AL 8 hysteresis	No	O	O
657Ch	Array	AL 8 group OR	No	O	O
657Dh	Array	AL 8 state	Possible	M	M
657Eh	Array	AL 8 reset	No	M	M
6600h	Array	AL 1 to 8 state	Possible	M	M
6602h	VAR	AL general OR state	Possible	O	O
6603h	VAR	AL group 1 to 8 OR state	Possible	O	O
6610h	VAR	AL general reset	Possible	M	M
6611h	Array	AL 1 to 8 reset	Possible	O	O
660Ch	Array	AL 1 group AND	Possible	O	O
6622h	VAR	AL general AND state	Possible	O	O
6623h	VAR	AL Group 1 to 8 AND state	Possible	O	O
6630h	VAR	AL snap shot trigger	Possible	O	O
960Ah	Array	AL 1 snap shot value	No	O	O
960Bh	Array	AL 1 snap shot time	No	O	O

4.1 AL 1 link input

This object describes the source for the AL Input Value, which lies in the analog input block.

Index	Sub-Index	Name	Data type	Access	Default value	Value range
6503h	00h	Highest sub-index supported	Unsigned8	const	ms	01h to 80h
	01h	AL 1 link input 1	Unsigned32	rw	ms	CiA 404
	..	..	..	..	..	..
	80h	AL 1 link input 128	Unsigned32	rw	ms	CiA 404

4.2 AL 1 link alternate input

This object describes the source for the alternate input to the alarm block. This alternate input is only used if functionality needs two input values.

Index	Sub-Index	Name	Data type	Access	Default value	Value range
6505h	00h	Highest sub-index supported	Unsigned8	const	ms	01h to 80h
	01h	AL 1 link alternate input 1	Unsigned32	rw	ms	Unsigned32
	..	..	..	..	..	..
	80h	AL 1 link alternate input 128	Unsigned32	rw	ms	Unsigned32

4.3 AL 1 type

This object specifies the alarm type.
The definition from CiA 404 is limited to the values 0 to 7 (0 to 5 are mandatory, 6 and 7 are optional).

Index	Sub-Index	Name	Data type	Access	Default value	Value range
6508h	00h	Highest sub-index supported	Unsigned8	const	ms	01h to 80h
	01h	AL 1 type 1	Unsigned8	rw	00h	00h to 07h
	..	..	..	..	..	..
	80h	AL 1 type 128	Unsigned8	rw	00h	00h to 07h

Alarm types:

0h : No alarm unction
1h : Sensor fault
2h : Above or equal
3h : Below
4h : Difference above
5h : Difference below
6h : In window
7h : Out of window

4.4 Alarm 1 level

This object represents the level, which the AL input value is compared with.

Index	Sub-Index	Name	Data type	Access	Default value	Value range
950Ah	00h	Highest sub-index supported	Unsigned8	const	ms	01h to 80h
	01h	AL 1 level 1	Integer32	rw	0d	Integer32
	..	..	..	..	..	..
	80h	AL 1 level 128	Integer32	rw	0d	Integer32

4.5 AL 1 hysteresis

This object represents the hysteresis, which is used for comparison of AL Input Value and AL Level. It helps the AL State not to alter too fast when AL Input Values are noisy.

Index	Sub-Index	Name	Data type	Access	Default value	Value range
950Bh	00h	Highest sub-index supported	Unsigned8	const	ms	01h to 80h
	01h	AL 1 level 1	Integer32	rw	+1d	Integer32
	..	..	..	..	..	..
	80h	AL 1 level 128	Integer32	rw	+1d	Integer32

4.6 AL 1 group OR

Alarm Outputs can be grouped together, so that multiple alarms are grouped to a single AL Group State bit. A maximum of 8 groups can be defined. A value of 0 means, that the alarm state in not tied to an alarm group.

Index	Sub-Index	Name	Data type	Access	Default value	Value range
650Ch	00h	Highest sub-index supported	Unsigned8	const	ms	01h to 80h
	01h	AL 1 group OR 1	Unsigned8	rw	00h	00h to 08h
	..	..	..	..	..	..
	80h	AL 1 group OR 128	Unsigned8	rw	00h	00h to 08h

4.7 AL 1 state

Alarm state represents the result of the alarm comparison.
Objects 651Dh to 657Dh are defined similarly.

Index	Sub-Index	Name	Data type	Access	Default value	Value range
650Dh	00h	Highest sub-index supported	Unsigned8	const	ms	01h to 80h
	01h	AL 1 state 1	Boolean	ro	No	Boolean
	..	..	..	..	..	..
	80h	AL 1 state 128	Boolean	ro	No	Boolean

4.8 AL 1 reset

This object resets the alarm function block, which is important, if hysteresis or starting conditions are defined.
Objects 651Eh …657Eh are defined similarly.

Index	Sub-Index	Name	Data type	Access	Default value	Value range
650Eh	00h	Highest sub-index supported	Unsigned8	const	ms	01h to 80h
	01h	AL 1 reset 1	Boolean	wo	FALSE	Boolean
	..	..	..	..	..	..
	80h	AL 1 reset 128	Boolean	wo	FALSE	Boolean

4.9 AL 1 to 8 state

Alarm state represents the result of the alarm comparison of alarm number 1 to 8.
Bit 0..7 = alarm number 1..8; 0=not occurred, 1=occurred.

Index	Sub-Index	Name	Data type	Access	Default value	Value range
6600h	00h	Highest sub-index supported	Unsigned8	const	ms	01h to 80h
	01h	AL 1 to 8 state 1	Unsigned8	ro	No	Unsigned8
	..	..	..	..	..	..
	80h	AL 1 to 8 state 128	Unsigned8	ro	No	Unsigned8

4.10 AL general OR state

Logical OR-result of all alarm states of all alarm channels.

Index	Sub-Index	Name	Data type	Access	Default value	Value range
6602h	00h	AL general OR state	Boolean	ro	No	Boolean

4.11 AL group 1 to 8 OR state

A single bit in the group alarm state is set to one if at least one of the alarms tied to this group is true.
Bit 0..7 = group number 1..8; 0=not occurred, 1=occurred.

Index	Sub-Index	Name	Data type	Access	Default value	Value range
6603h	00h	AL group 1 to 8 OR state	Unsigned8	ro	No	Unsigned8

4.12 AL General Reset

This object resets all alarms of all channels within the unit.

Index	Sub-Index	Name	Data type	Access	Default value	Value range
6610h	00h	AL general reset	Boolean	wo	FALSE	Boolean

4.13 AL 1 to 8 reset

Alarm state represents reset bits of alarm number 1 to 8 grouped together within one byte.
Bit 0..7 = alarm number 1..8; 0=do not perform reset, 1= perform reset.

Index	Sub-Index	Name	Data type	Access	Default value	Value range
6611h	00h	Highest sub-index supported	Unsigned8	const	ms	01h to 80h
	01h	AL 1 to 8 reset 1	Unsigned8	wo	00h	Unsigned8
	..	..	..	..	..	..
	80h	AL 1 to 8 reset 128	Unsigned8	wo	00h	Unsigned8

4.14 AL 1 group AND

This alarm group is similar to the Alarm 1 Group object 650Ch.
Objects 661Ch, 662Ch ... 667Ch are defined similar.
Contrary to object 650Ch, the alarms of this group are AND-linked, not OR-linked.

Index	Sub-Index	Name	Data type	Access	Default value	Value range
660Ch	00h	Highest sub-index supported	Unsigned8	const	ms	01h to 80h
	01h	AL 1 group AND 1	Unsigned8	rw	ms	00h *to* 08h
	..	..	..	..	..	..
	80h	AL 1 group AND 128	Unsigned8	rw	ms	00h *to* 08h

4.15 AL general AND state

Logical AND-result of all alarm states of all alarm channels.

Index	Sub-Index	Name	Data type	Access	Default value	Value range
6622h	00h	Alarm general AND state	Boolean	ro	No	Boolean

4.16 AL group 1 to 8 AND state

A single bit in the group alarm state is set to one if all of the alarms tied to this group are true.
Bit 0 *to* 7 = group number 1 *to* 8; 0 = AL not occurred, 1 = AL occurred.

Index	Sub-Index	Name	Data type	Access	Default value	Value range
6623h	00h	Alarm group 1 to 8 AND state	Unsigned8	ro	No	Unsigned8

4.17 AL Snap Shot Trigger

TRUE = Snap Shot Trigger; FALSE = Take no action
Trigger signal to store the Snap Shot Value and to measure the Snap Shot Time.
The snap shot value and time parameters are deleted with the AL general reset (6610h).

Index	Sub-Index	Name	Data type	Access	Default value	Value range
6630h	00h	AL snap shot trigger	Boolean	wo	FALSE	Boolean

4.18 AL 1 snap shot value

This object stores the current AL input value at the time the trigger signal was sent (object 6630h = 1)
Objects 961Ah, 962Ah ... 967Ah are defined similarly.

Index	Sub-Index	Name	Data type	Access	Default value	Value range
960Ah	00h	Highest sub-index supported	Unsigned8	const	ms	01h to 80h
	01h	AL 1 snap shot value 1	Integer32	ro	No	Integer32
	..	..	..	..	..	..
	80h	AL 1 snap shot value 128	Integer32	ro	No	Integer32

4.19 Alarm 1 snap shot time

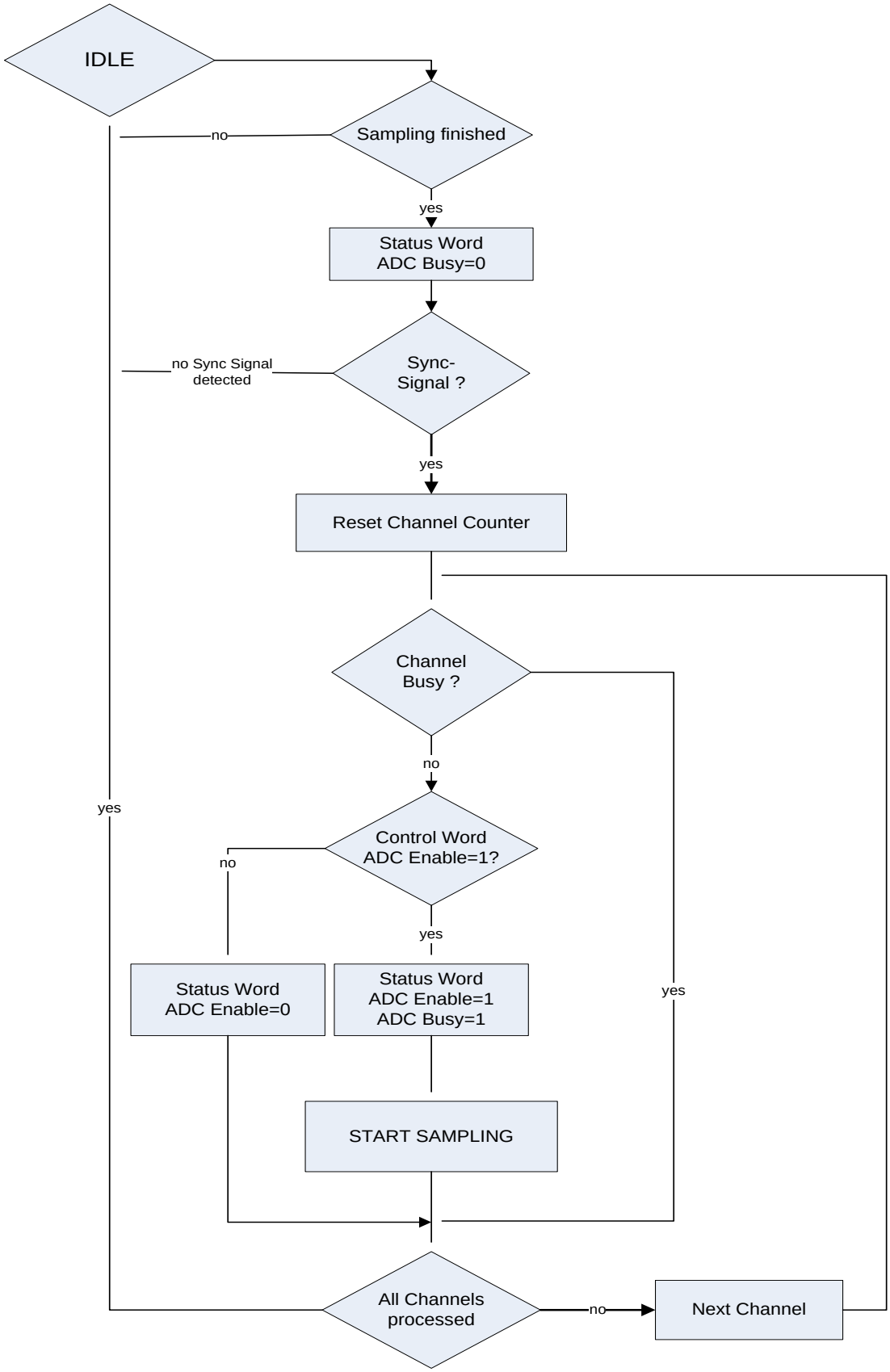
The snap shot time is given in µs.
1.) Duration from snap shot signal trigger (6630h = 1) to AL level reached.
2.) If the AL level is reached before snap shot signal (6630h = 1), the time duration up to the snap shot signal is defined as a negative time.
The respective AL state (Object 6600h) shows whether the AL level has been reached.
If the AL level is not reached, the snap shot time = 0.

Objects 961Bh, 962Bh ... 967Bh are defined similarly.

Index	Sub-Index	Name	Data type	Access	Default value	Value range
960Bh	00h	Highest sub-index supported	Unsigned8	const	ms	01h to 80h
	01h	AI 1 snap shot time 1	Integer32	ro	No	Integer32
	..	..	..	..	..	..
	80h	AI 1 snap shot time 128	Integer32	ro	No	Integer32

5 Appendix

5.1 Flow-chart: “ADC enable” and “ADC Busy” (Status word-2 6152h, Control word-2 6162h)



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