

EUROMAP 75-1	<p>Protocol for Communication with Peripheral Equipment</p> <p>Device Profile for Measuring Amplifiers</p>
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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 DSP-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

EUROMAP	European Committee of Manufacturers of Plastics and Rubber Machinery (http://www.euromap.org/).
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/).
CAL	CAN Application Layer. Communication mechanisms standardized by CiA for CANbased systems (DS 201..207).
CANopen	Communication profiles (DS 301) and device profiles (CiA DS 40x) based on CAL, standardized by CiA.

1.4 References

Short name	Title	Version	Autor
EUROMAP 75	EUROMAP 75-1 "Protocol for Communication with Peripheral Equipment - Device Profile for Measuring Amplifiers"	1.1	EUROMAP
	EUROMAP 75-2 "Protocol ... - Demands on EUROMAP 75 Devices"	1.1	
	EUROMAP 75-3 "Protocol ... - Implementation of Different Realtime Ethernet Systems"	1.2	
CiA DS-102	CAN Physical Layer for Industrial Applications	2.0	CiA
CiA DS-301	CANopen Application Layer and Communication Profile	4.0	CiA
CiA DSP-404	Device Profile for Measuring Devices and closed-loop controllers	1.0	CiA

1.5 Document Overview

This document is divided into:

- General Device Description mandatory
- Analogue Input Function Block similar to DSP-404 mandatory
- Alarm Function Block similar to DSP-404 optional
- Default Mapping

The Analogue Input Function Block and the Alarm Function Block taken from DSP-404 have been adapted / extended for measuring amplifiers.

Textual characters are represented in Unicode UTF8 format!

2 General Device Description

Index	Object	Description	Acc	PDO Mapping	Master (ma- chine)	Slave (de- vice)	
6E00h	VAR	EUROMAP75_Device_Profile	ro	no	M	M	EUROMAP Device Profile
6E08h	VAR	Manufacturer Device Name	ro	no	M	M *	
6E09h	VAR	Manufacturer Hardware Version	ro	no	M	M *	
6E0Ah	VAR	Manufacturer Software Version	ro	no	O	O *	
6E01h	VAR	Manufacturer Name	ro	no	M	M *	
6E02h	VAR	Device Category	ro	no	M	M *	
6E03h	VAR	Serial Number	ro	no	M	M *	
6E04h	VAR	Calibration date	ro	no	M	M *	
	VAR	Documentation	ro	no	O	O *	
6E40.1h	VAR	IP Address	rw	no	O	O *	Only for TCP/IP communication IPv4
6E40.2h	VAR	Subnet Mask	rw	no	O	O *	Only for TCP/IP communication IPv4
6E40.3h	VAR	MAC Address	ro	no	O	O *	

* As an alternative, these parameters can be implemented in the device description of the bus system used.

2.1 EUROMAP 75 Device Profile

This object defines the EUROMAP device profile.

Index	Sub-Index	Name	Type	Attr	Default val.	Range
6E00h	0	EUROMAP75_Device_Profile	Unsigned32	ro	01 00 01 4Bh	

For more Information see [general description EUROMAP 75].

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 40h
- etc.

2.2 Manufacturer Device Name

Object 6E08h contains the manufacturer device name as UNICODE UTF8-String. Example: measuring system xy. (Do not use more than 20 Bytes!).

Index	Sub-Index	Name	Type	Attr	Default val.	Range
6E08h	0	Manufacturer_Device_Name	Unicode UTF8-String	ro		

2.3 Manufacturer Hardware Version

Object 6E09h contains the device hardware version as UNICODE UTF8-String. Example: 1.0.2. (Do not use more than 20 Bytes!).

Index	Sub-Index	Name	Type	Attr	Default val.	Range
6E09h	0	Manufacturer_Hardware_Version	Unicode UTF8-String	ro		

2.4 Manufacturer Software Version

Object 6E0Ah contains the device software version as UNICODE UTF8-String. Example: 2.3.4. (Do not use more than 20 Bytes!).

Index	Sub-Index	Name	Type	Attr	Default val.	Range
6E0Ah	0	Manufacturer_Software_Version	Unicode UTF8-String	ro		

2.5 Manufacturer Name

Object 6E01h contains the manufacturer name as UNICODE UTF8-String. Example: "VDMA Organization". (Do not use more than 20 Bytes!).

Index	Sub-Index	Name	Type	Attr	Default val.	Range
6E01h	0	Manufacturer_Name	Unicode UTF8-String	ro		

2.6 Device Category

Object 6E02h contains the device category as UNICODE UTF8-String. Example: "P/C device" for pressure and temperature measuring devices. (Do not use more than 20 Bytes!).

Index	Sub-Index	Name	Type	Attr	Default val.	Range
6E02h	0	Device_Category	Unicode UTF8-String	ro		

2.7 Serial Number

Object 6E03h contains the serial number of the device as UNICODE UTF8-String. (Do not use more than 20 Bytes!).

Index	Sub-Index	Name	Type	Attr	Default val.	Range
6E03h	0	Serial_Number	Unicode UTF8-String	ro		

2.8 Calibration Date

Object 6E04h contains the date of the last calibration of the device as Unicode UTF8-String. The coding is characters in format "yyyy-mm-dd". Example: 2009-02-16 (limited to 10 characters, no date is defined with "space characters").

Index	Sub-Index	Name	Type	Attr	Default val.	Range
6E04h	0	Calibration_Date	Unicode UTF8-String	ro		

2.9 Documentation

Documentation (e.g. datasheet) as file in a ADOBE® pdf- format, pdf Version max. 1.4. (standard TTF or special font including)

Index	Sub-Index	Name	Type	Attr	Default val.	Range
	0	Documentation	File	ro		

Re-assemble_Max_Size: The size of the largest IP datagram which this entity can re-assemble from incoming IP fragmented datagrams received on this interface.

2.10 Address Table 6E40h

Used only for TCP/IP communication IPv4

Index	Sub-Index	Name	Type	Attr	Default value	Range
6E40h		IP Address Table	Record			
	1	IP Address	4 Byte	rw		
	2	Subnet Mask	4 Byte	rw		
	3	MAC Address	6 Byte	ro		

3 Analogue Input Function Block

Index	Object	Description	Acc	PDO Mapping	Master (ma- chine)	Slave (de- vice)	
61E0h	VAR	Number of channels	ro	no	M	M	Number of measuring channels (1 - 128)
9130h	Array	Input Process Value	ro	possible	M	M	
61E1h	Array	Sensor Type List	ro	no	M	M	
6110h	Array	Sensor Type	rw	possible	M	M	
61E2h	Array	Auto Detected Sensor Type	ro	possible	M	O	
9126h	Array	Auto Detected Scaling Factor	ro	possible	M	O	
6132h	Array	Decimal Digits of Scaling Factor	ro	possible	M	O	
61E3h	Array	Span number	rw	possible	M	M	
6150h	Array	Status Word	ro	possible	M	M	
6160h	Array	Control Word	rw	possible	M	M	
6114h	Array	Time until Data is valid	ro	no	M	M	
61E4h	Array	SpanList	ro	no	M	M	

3.1 Number of Channels

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

Index	Sub-Index	Name	Type	Attr	Default val.	Range
61E0h	0	Number_of_channels	Unsigned8	ro	1	1..128

3.2 Input Process Value

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

Index	Sub-Index	Name	Type	Attr	Default val.	Range
9130h		Input_Process_Value	Array			1..128 (61E0h)
	01	Input_Process_Value_1	Integer32	ro	0	
	..					
	128	Input_Process_Value_128	Integer32	ro	0	

Table of scaling factors for Input_Process_Value:

Temperature	0,001 °C / Bit
Piezoelectric	0,001 pC / Bit
Strain	0,001 µV/V / Bit
Voltage	0,001 mV / Bit
Current	0,001 mA / Bit
Flow	0,001 cm ³ /s / Bit
Stroke	0,100 µm / Bit
Velocity	0,100 µm/s / Bit

3.3 Sensor Type List

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

Index	Sub-Index	Name	Type	Attr	Default val.	Range
61E1h		Sensor_Type_List	Array			1..128 (61E0h)
	01	Sensor_Type_List_1	Unsigned32	ro	0	
	..					
	128	Sensor_Type_List_128	Unsigned32	ro	0	

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 channel supports thermo couples of type J, K, L, N – without automatic switch-over function.

3.4 Sensor Type

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

Index	Sub-Index	Name	Type	Attr	Default val.	Range
6110h		Sensor_Type	Array			1..128 (61E0h)
	01	Sensor_Type_1	Unsigned8	rw	0	
	..					
	128	Sensor_Type_128	Unsigned8	rw	0	

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	Meaning
0x0000	reserved
0x0001	Thermocouple type J
0x0002	Thermocouple type K
0x0003	Thermocouple type L
0x0004	Thermocouple type N
0x0027 (39 dec)	KTY
0x001E (30 dec)	PT100
0x0021 (33 dec)	PT1000
0x0028 (40 dec)	Voltage
0x0032 (50 dec)	Current
0x0044 (68 dec)	General measuring system
0x0045 (69 dec)	Flow
0x0046 (70 dec)	Strain gauge
0x004A (74 dec)	Strain gauge Piezo-resistive
0x004C (76 dec)	Piezo-electric
0x0058 (88 dec)	Stroke
0x0059 (89 dec)	Velocity

3.5 Auto-detected Sensor Type

This object describes the automatically detected sensor type.

Index	Sub-Index	Name	Type	Attr	Default val.	Range
61E2h		Auto-detected_Sensor_Type	Array			1..128 (61E0h)
	01	Auto-detected_Sensor_Type_1	Unsigned8	ro	0	
	..					
	128	Auto-detected_Sensor_Type_128	Unsigned8	ro	0	

Auto-detected_Sensor_Type:

0 = no sensor detected, the device then 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 Auto-detected Scaling Factor

This object describes the automatically detected sensor sensitivity.

Index	Sub-Index	Name	Type	Attr	Default val.	Range
9126h		Auto_Detected_Scaling_Factor	Array			1..128 (61E0h)
	01	Auto_Detected_Scaling_Factor_1	Integer32	ro	0	
	..					
	128	Auto_Detected_Scaling_Factor_128	Integer32	ro	0	

Auto_Detected_Scaling_Factor:

Sensor sensitivity = 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 Decimal Digits of 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	Type	Attr	Default val.	Range
6132h		Decimal_Digits_of_Scaling_Factor	Array			1..128 (61E0h)
	01	Decimal_Digits_of_Scaling_Factor_1	Unsigned8	ro	0	
	..					
	128	Decimal_Digits_of_Scaling_Factor_128	Unsigned8	ro	0	

3.8 Span Number

This object selects the measuring range of the channel.

Index	Sub-Index	Name	Type	Attr	Default val.	Range
61E3h		Span_Number	Array			1..128 (61E0h)
	01	Span_Number_1	Unsigned8	rw	1	
	..					
	128	Span_Number_128	Unsigned8	rw	1	

3.9 Status Word

This object provides status information.

Index	Sub-Index	Name	Type	Attr	Default val.	Range
6150h		Status_Word	Array			1..128 (61E0h)
	01	Status_Word_1	Unsigned16	ro		
	..					
	128	Status_Word_128	Unsigned16	ro		

Status_Word:

- 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.)

3.10 Control Word

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

Index	Sub-Index	Name	Type	Attr	Default val.	Range
6160h		Control_Word	Array			1..128 (61E0h)
	01	Control_Word_1	Unsigned16	rw		
	..					
	128	Control_Word_128	Unsigned16	rw		

Control_Word:

- 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

** SLP teach-in start = Activating the "self-optimizing switching-point detection" teach-in function

3.11 Time until Data is valid

Time until Data is valid in nsec.

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	Type	Attr	Default val.	Range
6114h		Time_until_Data is_valid	Array			1..128 (61E0h)
	01	Time_until_Data is_valid _1	Unsigned32	ro	0	
	..					
	128	Time_until_Data is_valid _128	Unsigned32	ro	0	

3.12 Span List

List of measuring ranges

Index	Sub-Index	Name	Type	Attr	Default val.	Range
61E4h		Span_List	Array			1..128 (61E0h)
	01	Span_List _1	DOMAIN	ro		
	..					
	128	Span_List _128	DOMAIN	ro		

Definition of the data structure of the Span List

Span_List DOMAIN

Name	Type	Range	
Number of entries	Unsigned8	1-n	Number of groups of sensor types with identical measuring ranges
Sensor type list 1	Unsigned32		Group 1 of sensor types
Number of meas. ranges 1	Unsigned8	1-a	Number of measuring ranges for group 1
Span 1 start	Integer32		Meas. range 1 start
Span 1 end	Integer32		Meas. range 1 end
...			
Span a start	Integer32		Meas. range a start
Span a end	Integer32		Meas. range a end
Sensor type list 2	Unsigned32		Group 2 of sensor types
Number of meas. ranges 2	Unsigned8	1-b	Number of measuring ranges for group 2
Span 1 start	Integer32		Meas. range 1 start
Span 1 end	Integer32		Meas. range 1 end
...			
Span b start	Integer32		Meas. range b start
Span b end	Integer32		Meas. range b end
...			
Sensor type list n	Unsigned32		Group n of sensor types
Number of meas. ranges n	Unsigned8	1-x	Number of measuring ranges for group n
Span 1 start	Integer32		Meas. range 1 start
Span 1 end	Integer32		Meas. range 1 end
...			
Span x start	Integer32		Meas. range x start
Span x end	Integer32		Meas. range x end

The parameters "Sensor Type List 1–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 (9139h).

Examples for the structure of the Span_List (object 61E4h)

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

Name	Type	Value	
Number of entries	Unsigned8	1	Number of groups of sensor types with identical meas. ranges
Sensor Type List 1	Unsigned32	0x00100200	Group 1 of sensor types
Number of meas. ranges 1	Unsigned8	2	Number of meas. ranges für group 1
Span 1 start	Integer32	0	Meas. range 1 start
Span 1 end	Integer32	5.000.000	Meas. range 1 end
Span 2 start	Integer32	0	Meas. range 2 start
Span 2 end	Integer32	20.000.000	Meas. range 2 end

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

Name	Type	Value	
Number of entries	Unsigned8	1	Number of groups of sensor types with identical meas. ranges
Sensor Type List 1	Unsigned32	0x0008000F	Group 1 of sensor types
Number of meas. ranges 1	Unsigned8	1	Number of meas. ranges für group 1
Span 1 start	Integer32	0	Meas. range 1 start
Span 1 end	Integer32	500.000	Meas. 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	Type	Value	
Number of entries	Unsigned8	2	Number of groups of sensor types with identical meas. ranges
Sensor Type List 1	Unsigned32	0x00100200	group 1 of sensor types
Number of meas. ranges 1	Unsigned8	2	Number of meas. ranges for group 1
Span 1 start	Integer32	0	Meas. range 1 start
Span 1 end	Integer32	5.000.000	Meas. range 1 end
Span 2 start	Integer32	0	Meas. range 2 start
Span 2 end	Integer32	20.000.000	Meas. range 2 end
Sensor Type List 2	Unsigned32	0x0008000F	group 2 of sensor types
Number of meas. ranges 1	Unsigned8	1	Number of meas. ranges für group 2
Span 1 start	Integer32	0	Meas. range 1 start
Span 1 end	Integer32	500.000	Meas. range 1 end

4 Alarm Function Block

Index	Object	Description	Acc	PDO Mapping	Master (ma- chine)	Slave (de- vice)	
6503h	Array	Alarm 1 Link Input	rw	no	M	M	
6505h	Array	Alarm 1 Link Alternate Input	rw	no	O	O	
6508h	Array	Alarm 1 Type	rw	no	M	M	
950Ah	Array	Alarm 1 Level	rw	no	M	M	
950Bh	Array	Alarm 1 Hysteresis	rw	no	O	O	
650Ch	Array	Alarm 1 Group OR	rw	no	O	O	
650Dh	Array	Alarm 1 State	ro	possible	M	M	
650Eh	Array	Alarm 1 Reset	wo	no	M	M	
.....	Objects 651xh, 652xh ... 657xh are defined similar.	
6573h	Array	Alarm 8 Link Input	rw	no	M	M	
6575h	Array	Alarm 8 Link Alternate Input	rw	no	O	O	
6578h	Array	Alarm 8 Type	rw	no	M	M	
957Ah	Array	Alarm 8 Level	rw	no	M	M	
957Bh	Array	Alarm 8 Hysteresis	rw	no	O	O	
657Ch	Array	Alarm 8 Group OR	rw	no	O	O	
657Dh	Array	Alarm 8 State	ro	possible	M	M	
657Eh	Array	Alarm 8 Reset	wo	no	M	M	
6600h	Array	Alarm 1..8 State	ro	possible	M	M	
6602h	VAR	Alarm General OR State	ro	possible	O	O	
6603h	VAR	AL Group 1..8 OR State	ro	possible	O	O	
6610h	VAR	Alarm General Reset	wo	possible	M	M	
6611h	Array	Alarm 1..8 Reset	wo	possible	O	O	
660Ch	Array	Alarm 1 Group AND	rw	possible	O	O	Logical AND alarms
6622h	VAR	Alarm General AND State	ro	possible	O	O	Logical AND alarms
6623h	VAR	AL Group 1..8 AND State	ro	possible	O	O	Logical AND alarms
6630h	VAR	Alarm Snap Shot Trigger	wo	possible	O	O	Trigger signal
960Ah	Array	Alarm 1 Snap Shot Value	ro	no	O	O	value at trigger event
960Bh	Array	Alarm 1 Snap Shot Time	ro	no	O	O	Time in usec.

4.1 Alarm 1 Link Input

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

Index	Sub-Index	Name	Type	Attr	Default val.	Range
6503h		AI 1 Link Input	Array			
	00	Number_of_entries	Unsigned8	ro		1..128
	01	AI 1 Link Input _1	Unsigned32	rw		
	..					
	128	AI 1 Link Input _128	Unsigned32	rw		

4.2 Alarm 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	Type	Attr	Default val.	Range
6505h		AI 1 Link Alternate Input	Array			
	00	Number_of_entries	Unsigned8	ro		1..128
	01	AI 1 Link Alternate Input _1	Unsigned32	rw		
	..					
	128	AI 1 Link Alternate Input _128	Unsigned32	rw		

4.3 Alarm 1 Type

This object specifies the alarm type.

The definition from DSP-404 is limited to the values 0-7 (0-5 is mandatory, 6,7 is optional).

Index	Sub-Index	Name	Type	Attr	Default val.	Range
6508h		AI 1 Type	Array			
	00	Number_of_entries	Unsigned8	ro		1..128
	01	AI 1 Type _1	Unsigned8	rw		0-7
	..					
	128	AI 1 Type _128	Unsigned8	rw		0-7

Alarm Type:

- 0h : No Alarm Function
- 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	Type	Attr	Default val.	Range
650Ah		AI 1 Level	Array			
	00	Number_of_entries	Unsigned8	ro		1..128
	01	AI 1 Level _1	Integer32	rw		
	..					
	128	AI 1 Level _128	Integer32	rw		

4.5 Alarm 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	Type	Attr	Default val.	Range
650Bh		AI 1 Level	Array			
	00	Number_of_entries	Unsigned8	ro		1..128
	01	AI 1 Level _1	Integer32	rw		
	..					
	128	AI 1 Level _128	Integer32	rw		

4.6 Alarm 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 is not tied to an alarm group.

Index	Sub-Index	Name	Type	Attr	Default val.	Range
650Ch		Al 1 Group OR	Array			
	00	Number_of_entries	Unsigned8	ro		1..128
	01	Al 1 Group OR_1	Unsigned8	rw		0-8
	..					
	128	Al 1 Group OR_128	Unsigned8	rw		0-8

4.7 Alarm 1 State

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

Index	Sub-Index	Name	Type	Attr	Default val.	Range
650Dh		Al 1 State	Array			
	00	Number_of_entries	Unsigned8	ro		1..128
	01	Al 1 State _1	Boolean	ro		
	..					
	128	Al 1 State _128	Boolean	ro		

4.8 Alarm 1 Reset

This write-only 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	Type	Attr	Default val.	Range
650Eh		Al 1 Reset	Array			
	00	Number_of_entries	Unsigned8	ro		1..128
	01	Al 1 Reset _1	Boolean	wo		
	..					
	128	Al 1 Reset _128	Boolean	wo		

4.9 Alarm 1..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	Type	Attr	Default val.	Range
6600h		Al 1 State	Array			
	00	Number_of_entries	Unsigned8	ro		1..128
	01	Al 1 State _1	Unsigned8	ro		
	..					
	128	Al 1 State _128	Unsigned8	ro		

4.10 Alarm General OR State

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

Index	Sub-Index	Name	Type	Attr	Default val.	Range
6602h	0	Alarm General OR State	Boolean	ro		

4.11 Alarm Group 1..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	Type	Attr	Default val.	Range
6603h	0	Alarm Group 1..8 OR State	Unsigned8	ro		

4.12 Alarm General Reset

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

Index	Sub-Index	Name	Type	Attr	Default val.	Range
6610h	0	Alarm General Reset	Boolean	wo		

4.13 Alarm 1..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	Type	Attr	Default val.	Range
6611h		Al 1 Reset	Array			
	00	Number_of_entries	Unsigned8	ro		1..128
	01	Al 1..8 Reset _1	Unsigned8	wo		
	..					
	128	Al 1..8 Reset _128	Unsigned8	wo		

4.14 Alarm 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	Type	Attr	Default val.	Range
660Ch		Al 1 Group AND	Array			
	00	Number_of_entries	Unsigned8	ro		1..128
	01	Al 1 Group AND _1	Unsigned8	rw		0-8
	..					
	128	Al 1 Group AND _128	Unsigned8	rw		0-8

4.15 Alarm General AND State

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

Index	Sub-Index	Name	Type	Attr	Default val.	Range
6622h	0	Alarm General AND State	Boolean	ro		

4.16 Alarm Group 1..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..7 = group number 1..8; 0=not occurred, 1=occurred.

Index	Sub-Index	Name	Type	Attr	Default val.	Range
6623h	0	Alarm Group 1..8 AND State	Unsigned8	ro		

4.17 Alarm Snap Shot Trigger

1 = Snap Shot Trigger.

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 Alarm General Reset (6610h).

Index	Sub-Index	Name	Type	Attr	Default val.	Range
6630h	0	Alarm Snap Shot Trigger	Boolean	wo		

4.18 Alarm 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	Type	Attr	Default val.	Range
960Ah		Al Snap Shot Value	Array			
	00	Number_of_entries	Unsigned8	ro		1..128
	01	Al 1 Snap Shot Value _1	Integer32	ro	0	
	..					
	128	Al 1 Snap Shot Value _128	Integer32	ro	0	

4.19 Alarm 1 Snap Shot Time

Snapshot Time is defined in usec.

1.) Duration from Snap Shot Signal Trigger (6630=1) to Alarm Level Reached.

2.) If the Alarm Level is reached before Snap Shot Signal (6630=1), the time duration up to the Snap Shot Signal is defined as a negative time.

The respective Alarm State (Object 6600h) shows whether the Alarm Level has been reached.

If the Alarm Level is not reached, the Snap Shot Time = 0.

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

Index	Sub-Index	Name	Type	Attr	Default val.	Range
960Bh		Al 1 Snap Shot Time	Array			
	00	Number_of_entries	Unsigned8	ro		1..128
	01	Al 1 Snap Shot Time _1	Integer32	ro	0	
	..					
	128	Al 1 Snap Shot Time _128	Integer32	ro	0	

5 Appendix

5.1 Default PDO Mapping

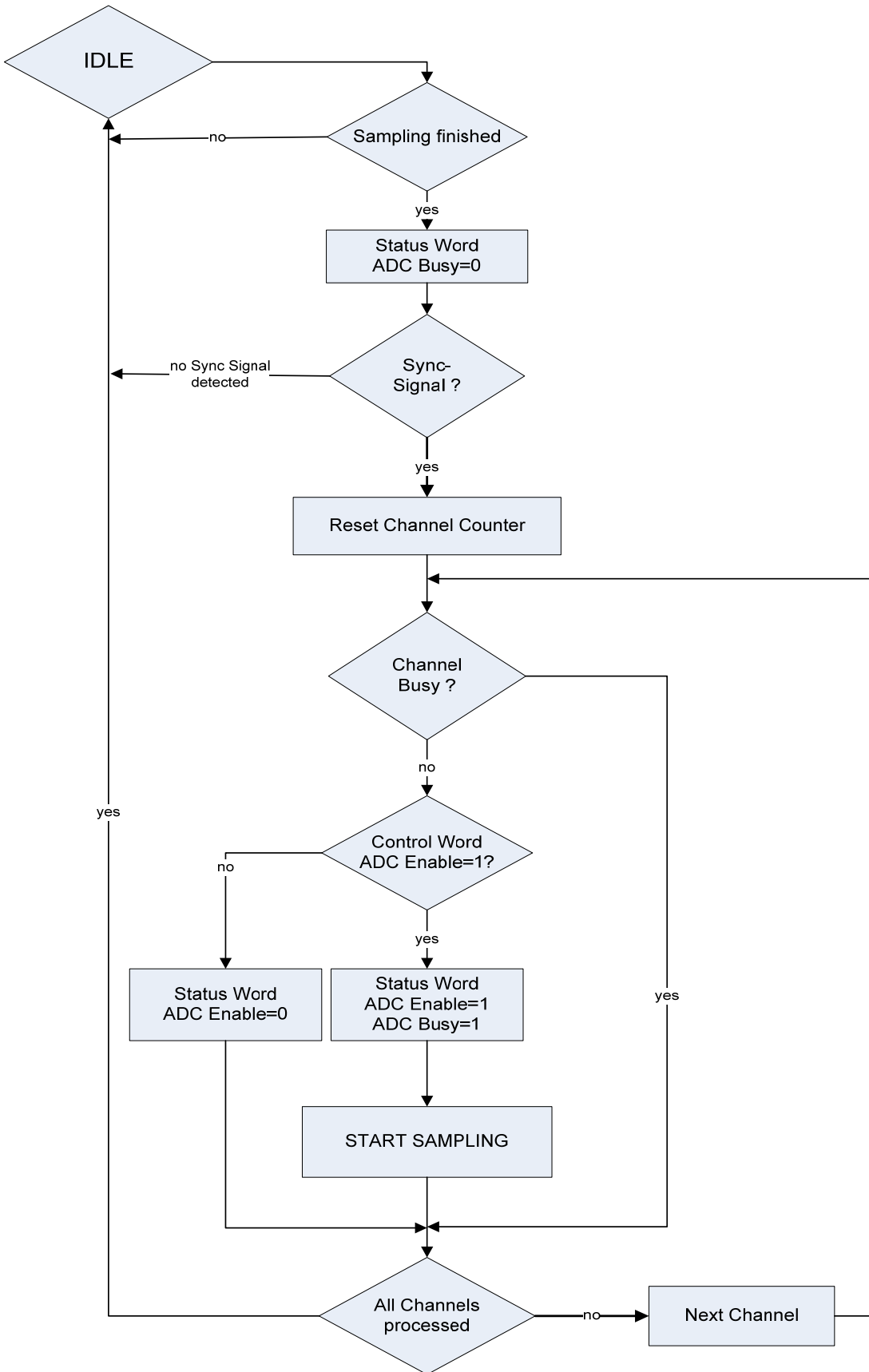
Process data structure (RPDO) with one "Default Mapping" no. 0 via "Number of channels", with 61E0 = 8.

Number of channels	Unsigned8	8	Number of measuring channels (default = 61E0, may be limited by the application)
Alarm block optional	Unsigned8	0	Bit 0: 6610 Alarm General Reset Bit 1: 6630 Alarm Snapshot Trigger
Measuring channel 1	Unsigned16		6160/1 Control Word.1
	Unsigned8		61E3/1 Span number.1
	Unsigned8		6110/1 Sensor Type.1
Measuring channel 2	Unsigned16		6160/2 Control Word.2
	Unsigned8		61E3/2 Span number.2
	Unsigned8		6110/2 Sensor Type.2
Measuring channel 3	Unsigned16		6160/3 Control Word.3
	Unsigned8		61E3/3 Span number.3
	Unsigned8		6110/3 Sensor Type.3
Measuring channel 4	Unsigned16		6160/4 Control Word.4
	Unsigned8		61E3/4 Span number.4
	Unsigned8		6110/4 Sensor Type.4
Measuring channel 5	Unsigned16		6160/5 Control Word.5
	Unsigned8		61E3/5 Span number.5
	Unsigned8		6110/5 Sensor Type.5
Measuring channel 6	Unsigned16		6160/6 Control Word.6
	Unsigned8		61E3/6 Span number.6
	Unsigned8		6110/6 Sensor Type.6
Number of channels	Unsigned8	8	Number of measuring channels (default = 61E0, may be limited by the application)
Measuring channel 7	Unsigned16		6160/7 Control Word.7
	Unsigned8		61E3/7 Span number.7
	Unsigned8		6110/7 Sensor Type.7
Measuring channel 8	Unsigned16		6160/8 Control Word.8
	Unsigned8		61E3/8 Span number.8
	Unsigned8		6110/8 Sensor Type.8

Process data structure (TPDO) with one "Default Mapping" no. 0 via "Number of channels", with 61E0 = 8.

Number of channels	Unsigned8	8	Number of measuring channels (default = 61E0, may be limited by the application)
Alarm block optional	Unsigned8	0	Bit 0: 6602 Alarm General OR State Bit 1: 6622 Alarm General AND State
Measuring channel 1	Unsigned16		6150/1 Status Word.1
	Integer32		9130/1 Input Process Value.1
Measuring channel 2	Unsigned16		6150/2 Status Word.2
	Integer32		9130/2 Input Process Value.2
Measuring channel 3	Unsigned16		6150/3 Status Word.3
	Integer32		9130/3 Input Process Value.3
Measuring channel 4	Unsigned16		6150/4 Status Word.4
	Integer32		9130/4 Input Process Value.4
Measuring channel 5	Unsigned16		6150/5 Status Word.5
	Integer32		9130/5 Input Process Value.5
Measuring channel 6	Unsigned16		6150/6 Status Word.6
	Integer32		9130/6 Input Process Value.6
Measuring channel 7	Unsigned16		6150/7 Status Word.7
	Integer32		9130/7 Input Process Value.7
Measuring channel 8	Unsigned16		6150/8 Status Word.8
	Integer32		9130/8 Input Process Value.8

5.2 Flow-chart: "ADC enable" and "ADC Busy"



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