SINGLE AND MULTI TURN ABSOLUTE ENCODER

MEM-Bus PROFIBUS®

with Profibus protocol

Operating Manual

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CONTENTS

Absolute encoder with PROFIBUS protocol, class 2

1. Safety and operating instructions

Encoder purpose

The encoder is a precision measurement device used to determine angular positions and revolutions, and to provide them as electrical output signals to the follow-on device systems.

Installation

- The encoder must be installed by qualified experts only, with net voltage off and standstill shaft.
- Always observe the operating instructions of the machine manufacturer.

Safety

- Always observe prevention and safety norms during the installation and operation of the device
- Use the encoder exclusively for its intended purpose
- High voltage, current and rotating parts may cause serious or fatal injuries.
- Encoders must not be operated outside the specified limited values (see detailed product documentation).

Transport and storage

- Always transport or store encoders in their original packaging.
- Never drop encoders or expose them to major vibrations.

Mechanical assembly

- Do not open the device.
- Do not carry out mechanical changes on the device.
- Avoid impacts or shocks on the housing and shaft.
- Operate the device within its environmental specifications.

Electrical supply

- Carry out the wiring operations exclusively with unplugged voltage supply
- Do not operate on the electrical plant while the encoder is on.
- Ensure that the entire plant complies with EMC requirements. The installation environment and wiring affect the electromagnetic compatibility of the encoder.
  In particular:
  - before handling and installing the encoder, eliminate any electrostatic charge from your body and from any tool that will get in contact with the device
- supply the encoder with steady voltage free from electrical noise; if necessary, install EMC filters for the supply input
- always use shielded and, if possible, twisted cables
- do not use longer cables than necessary
- the device cable path should be away from power cables
- install the device away from possible interference sources, or shield it effectively
- connect the cable shield and the connector case to a protective earth and make sure that the protective earth is free from electrical noise; the connection to earth can be carried out at the encoder side and/or at the user side; it us up to the user to evaluate which is the best solution to keep the electrical interference as low as possible.

2. Generals

The device structure is modular.

The encoder has a resolution of 13 bit, corresponding to 8192 steps per revolution. Its integrated optical/magnetic sampling system makes it suitable for standard applications.

3. PROFIBUS-DP

Bus systems are connecting structures which generate communication between several components.
The Profibus-DP is a manufacturer-independent open communication system for applications in the fields of the automation of production processes. It can be distinguished into three variants:

- Profibus FMS for data communication between control units on the production and process management level.
- Profibus PA for process engineering applications.
- Profibus DP for fast data exchange between control units and decentred peripherals in automation engineering applications.

The Profibus system includes the following device types:

- DP Master class 1 (DPM1) is a control system which cyclically exchanges information with DP Slaves.
- DP Master class 2 (DPM2) is a progrmmable controller.
- DP Slave is a peripheral device which receives output data and forwards input data to the programmable logic controller.

The PROFIBUS system can be either mono-master or multi-master type, according to the number of active Masters during the operating phase.

- In a monomaster system there is only one Master class 1 and different DP Slaves are active in the bus.
- In a multimaster system, several Masters and DP Slaves are active in the bus. The Masters can either belong to class 1 or class 2.

PROFIBUS DP is featured by the following characteristics:

- • Short response times (1 ms with 32 users and 12 MBaud)
- • Reliable transmission procedure
- • Availability of a wide range of standardized system components
- • Good diagnostic capability
- • Simple handling and facility for upgrading
- • User-oriented bus system
- • Open system

Profibus-DP is standardized by standard EN 50170 Vol. 2. This standard defines the communication and user profiles. The user profile for interface converters is profile 1.1. The user profile is differentiated depending on the number of supported functions according to device class 1 and 2. Devices class 2 have a greater number of functions and contain all the functions of class 1. Parameterization and preset functions are supported only by class 2.

ELAP encoder is a Slave device and features the PROFIBUS-DP Profile for Encoders. It can be programmed either as Class 1 or as Class 2 device. For any omitted specification, please refer to the documents available on the site www.PROFIBUS.com.

GSD File

The GSD file is a descriptive file which provides all the encoder data required for the device operation.
The data can be divided into two sections:

- General definitions containing information such as the manufacturer's name, the product purpose, the identification code, the PROFIBUS protocol specific parameters and the baud rates.
- Application-related definitions including configuration possibilities, parameters, parameter descriptions, hardware and software status and diagnostic information

The format and content are defined according to the EN 50170 standard (see Draft Specifications for PROFIBUS Device Description and Device Integration).

The GSD file is an essential condition for parameterization and configuration of the encoder with any configuration tool.
ELAP encoder is supplied with its file ELAP0CB7.GSD, also available on the site www.elap.it. The GSD file must be installed in the Master device.

Device Class

The encoder class must be set during the device configuring operations.

Class 1 features the basic functions, namely:

- Transmission of the position value
- Modification of the counting direction
- Value preset

Besides the functions featured by Class 1, Class 2 also includes the following functions:

- Scaling functions control

4. Encoder operating parameters

Description of the operating parameters

Parameter	Description
Rotation direction	Behaviour of the output code depending on the rotation direction of the shaft seen looking at the flange CW = Increasing values with clockwise rotation CCW = Increasing values with counter clockwise rotation
Resolution	Number of steps per integral revolution
Measurement range	Total resolution = number of steps per revolution x number of revolutions
Preset value	Value assigned to the current position (reference)

Values of the operating parameters

Parameter	Value range	Default value	Data type
Rotation direction	CW / CCW	CW	Bit
Resolution	1 to 8192	8192	Unsigned 32
Measurement range	Single turn: 1 - 8192 (2 exp13) Multiturn: 1 - 536870912 (2 exp29)	8192 536870912	Unsigned 32
Preset value	From 0 to ‘measurement range’ -1	0	Unsigned 32

5. Data exchange among PROFIBUS-DP devices

5.1 Telegram structure

<table>
<tr><td rowspan="5">DP Master</td><td colspan="3">Request telegram</td><td rowspan="5">DP Slave</td></tr>
<tr><td>Footer info</td><td>Output data</td><td>Header info</td></tr>
<tr><td colspan="3"></td></tr>
<tr><td colspan="3">Reply telegram</td></tr>
<tr><td>Header info</td><td>Input data</td><td>Footer info</td></tr>
</table>

5.2 Initialization, restarting and user data communication

Before an exchange of useful information between the Master and Slave, every Slave is initialized according to the sequence described hereunder.

Diagnostic request from the Master

The Master transmits a Diagnosis Request to the Slave (Slave_Diag), and the Slave replies with a telegram containing the diagnostic data.
The Master uses this data to check whether the Slave exists in the bus and is ready for parameterization and configuration.

Parameterization of the Slave

The Master transmits a Parameter Request to the Slave (Set_Prm).
The Slave receives information about the current bus parameters, surveillance times and the Slave-specific parameters. The parameters are taken over by the Master during the project processing phase, partially directly or indirectly from the GSD file.

Configuration of the Slave

The Master transmits a Check Configuration Request (Chk_Cfg).
The Master provides the Slave all the information about the data which will be exchanged in input and output (number of bytes data and data type). The Slave compares this configuration with the one stored in its memory.

Diagnosis request prior to data exchange

The Master transmits another Slave Diagnosis Request (Slave_Diag), the Slave replies with a Slave Diagnosis Response.
The Master now checks whether the parameterization and configuration are correct. In the positive case, the Slave signals it is ready for the data transfer by means of the diagnosis data.

Data Exchange

The Slave now responds exclusively to the Master which has parameterized and configured it.
The Master transmits a user data request (Data_Exchange), the Slave replies with a user data response. In this response, the Slave informs the Master whether new diagnosis results are available. The Slave only makes known its diagnosis data and status information after the Master's diagnosis request.

6. Parameterization and configuration

6.1 Parameterization

Parameterization refers to the transfer of the information which the Slave requires for exchanging process data.
The information include some Profibus-specific data and some encoder specific information.
The parameters defined by the user are transferred to the encoder in different ways, according to the chosen version (parametering).
Usually the parameters are transferred automatically and the data are entered through a user interface of the software of the control device (eg. Step7 or WinPLC7).
However in some cases it is necessary to indicate specific bits and bytes according to the operating specifications to be set.
The data transfer is performed according with the sets indicated in the encoder profile, as shown in the following tables.

Description of parameters of the function Set_Prm.

Class	Parameter	Byte	Description
1	Station status	1	PROFIBUS protocol specific data • *Sync* / *Freeze* mode active • Response monitoring active • Master assigned
1	Response monitoring time	2 - 3	Recognition of Master failure, Master must respond within this period
1	Min. station delay responder (tsdr)	4	Minimum time which the Slave must wait before replying to the Master
1	Ident_number	5 - 6	Device identifier which must be unique for each type of device, saved and reserved by the PNO.
1	Group_Ident_Number	7	PROFIBUS protocol specific data
1	Operating parameters	8	PROFIBUS protocol specific data
1	Operating parameters	9	Application specific data • Counting direction • Functions of Class 2 • Scaling function
2	Single turn resolution	10 - 13	Number of steps per revolution
2	Total resolution	14 - 17	The total resolution is the number of measurement steps x the number of revolutions
2	Reserved	18 – 21	

Value of the parameters of the function Set_Prm.

Class	Parameter	Type	Byte	Value range	Default value in the GSD file
1	Station status	8 bit string	1		• Sync e Freeze modes supported • Baud rates supported
1	Response monitoring time	Word	2-3		PROFIBUS specific data
1	Tsdr	Byte	4		Depending from the baud rate
1	Ident_number	Word	5-6		0CB7H
1	Group_ident_no	Byte	7		00H
1	Operating parameters	8 bit string	8		PROFIBUS specific data
1	Operating parameters	8 bit string	9	Bit0 = 0/1 CW / CCW Bit1 = 0/1 Cl. 2 off/on Bit3 = Scale off/on	CW Class 2 ON Scale ON
2	Step resolution	Unsigned 32	10-13	1 – 8192	8192
2	Total resolution	Unsigned 32	14-17	Single turn: 1 – 8192 Multiturn: 1 – 536870912	8192 536870912
2	Reserved		18-21		0

Byte 9 – Operating parameters

- Bit 0 → Counting direction:
- It defines the direction of the encoder shaft must rotate to increment the encoder output value. The rotation direction is defined looking at the encoder from the shaft end.
- Bit 1 → Functions of Class 2:
- Disabled (0) = device set in Class 1
- Enabled (1) = device set in Class 2
- Bit 3 → Scaling function
- Disabled (0) = the encoder uses the physical resolutions of the instrument
- Enabled (1) = the encoder uses the resolutions sent in bytes 10 to 17

Byte 10…13 – Single turn resolution

These bytes define the required number of information per revolution (active if bit 1 = 1 and bit 3 = 1 of byte 9).

It is possible to set any integer value included between 1 and 8192 (number of "physical information per revolution), but it is advisable to set a power of 2 (4, 8, 16, 32, …, 2048, 4096).

In case the set number exceeds the admitted value, the info/revolution value will be forced to the max admitted value (8192).

Byte 14…17 – Programmed total resolution

These bytes define the required total resolution (active if bit 1 = 1 and bit 3 = 1 of byte 9).

It is possible to set values between 1 and the total physical resolution (8192 for the single turn encoder, 536870912 for the multiturn encoder).

In case the set number exceeds the admitted value, the total revolution value will be forced to the max admitted value.

The ratio between total resolution and single turn resolution defines the "programmed revolutions number".

6.2 Configuration

The configuration refers to the definition of the type, length and data direction of the process data, as well as the way in which the data will be processed. The type indicates the data type and whether the data are consistent. The length determines the number of data bytes available for use. The data direction defines whether data re-transferred from the Master to the Slave or vice versa.
The encoder is able to read the preset values and to transmit the current position value. The length is 2 words, and the data are consistent. The configuration is compared with the configuration stored in memory. The position value of the encoder is an input datum from the Mater point of view, while the preset value is an output datum.

Possible configurations

Class	Configuration	Description
1	F1H	2 words output data with data consistency for position values to max. 31 bits 2 words input data with data consistency for position values to max. 31 bit
2	F1H	2 words output data with data consistency for preset value to max. 31 bit 2 words input data with data consistency for position values to max. 31 bit

7. Diagnostic signals

Diagnostic signals contain data relating to the encoder status. The diagnostic signals include Profibus-relevant information and device-specific information. The Master controls communication with the Slave using this information, or forwards it to the higher-level system.

The Master requests diagnosis data both prior to parameterization and after configuration of the Slave. This ensures that the Slave is present in the bus and that the data stored in the control system software is in accordance with the data stored in the Slave.
Moreover the Master can request the diagnosis at any time, during the data exchange phase (Data_Exchange).
The user-specific information is defined in the EN 50170 standard under Encoder profile 1.1. The green LED integrated in the encoder bus cover indicates part of this information.

7.1 Description of the diagnosis data Slave_Diag

Class	Diagnosis data	Byte	Description
1	Station Status 1	1	Status of • Parameterization • Configuration • Diagnostic data (Diag.ext bit → alarms, Diag.stat bit → warnings)
1	Station Status 2	2	Status of • Response monitoring • Freeze or Sync mode active
1	Station Status 3	3	Not supported
1	Diag_Master	4	Address of the Master which first parameterized the Slave
1	Ident_number	5-6	Device identifier • Unique for each device type • Reserved and stored with the PNO
1	Extended diagnosis	7	Length of the encoder diagnosis including this byte in the case of extended diagnosis
1	Alarms	8	• Incorrect position error • Storage error (lost data)
1	Operating status	9	Indication of supported user-specific data • Counting direction • Encoder type class 1 or 2 • Scaling function
1	Encoder type	10	Indication of the encoder type
1	Single step resolution	11-14	Max resolution per revolution of the encoder
1	Revolutions number	15-16	Max number of revolutions of the encoder
2	Additional alarms signals	17	Not supported
2	Supported alarm signals	18-19	Indication of the supported alarm signals • Encoder incorrect position error • Storage error (lost data)

Class	Diagnosis data	Byte	Description
2	Warnings	20-21	It indicates when parameters are not within the admissible tolerance. Differently from alarm signals, these events do not result in incorrect position values. • Voltage of the buffer cell has dropped below the critical value (multiturn encoders only)
2	Supported warning signals	22-23	It indicates which warning signal is supported • Voltage of the buffer cell has dropped below the prescribed value (multiturn encoders only)
2	Profile version	24-25	Profile version of the communication profile with revision number and index
2	*Software version*	26-27	Program version, with index and revision.
2	Operating time counter	28-31	Encoder operating time since the last reset operation, expressed in hours/10.
2	Offset	32-35	It indicates the offset value stored in the EEPROM after the latest preset
2	Manufacturer offset	36-39	Not supported, reserved for servicing purposes
2	Steps per revolution	40-43	It indicates the programmed steps per revolution of the encoder
2	Total resolution	44-47	It indicates the programmed total resolution in steps of the encoder.
2	Serial number	48-57	Not supported
2	Reserved data	58-59	Not supported, reserved for future purposes
2	Manufacturer's specific data	60-63	Preset value (Software version 1.02 and following)

Incorrect position alarm signal

It is triggered at power on, in case of the buffer battery malfunctioning, with consequent loss of the stored position value. In this case the Diag.ext and Diag.stat. bits are set.

Warning signal buffer battery down

When the net supply is off, the buffer battery supplies voltage necessary to keep the storage of the operating parameters and of revolutions counter.

The buffer battery is monitored internally and, if its voltage drops under the critical level, the encoder sets the error bit Diag.ext. and provides an indication on the warning signal bit 5.

The revolutions counter and the other stored data are guaranteed for a certain time span, when they are powered by the battery. Once the time span has expired, the encoder must be permanently powered by an external voltage supply.
The time span which the encoder can continue to be operated depends on recognition of the event:

- The status signal already exists at the encoder power on. If the time of first occurrence is not known, the encoder must be withdrawn from service immediately.
- The status signal occurs during operation in the Data_Exchange mode; once the status signal is active, the encoder will continue to function for several weeks without problems before it needs to be replaced.

7.2 Parameter values of the diagnosis data Slave_Diag

Class	Diagnostic data	Type	Byte	Value range
1	Station status	24 bit string	1-3	PROFIBUS-specific data
1	Diag_Master	Byte	4	PROFIBUS-specific data
1	Ident_number	Word	5-6	0CB7H
1	Extended diagnosis	Byte	7	Class 1: 10 byte Class 2: 53/57 byte
1	Alarm signals	8 bit string	8	Bit 0 → Incorrect position error Bit 4 → lost data
1	Operating status	8 bit string	9	Bit 0 = 0 → Cw Bit 0 = 1 → Ccw Bit 1 = 1 → Class 2 supported Bit 3 = 0 → Scaling function OFF Bit 3 = 1 → Scaling function ON
1	Encoder type	Byte	10	00H → Single turn encoder 01H → Multiturn encoder
1	Single step resolution	Unsigned 32	11-14	8192 (byte 11 is MSB)
1	Revolutions number	Unsigned 16	15-16	byte 15 is MSB 1 (single turn encoder) 65535 (multiturn encoder)
2	Additional alarm signals	8 bit string	17	Not supported
2	Supported alarms	16 bit string	18-19	Bit 0 = 1 → Incorrect position error Bit 4 = 1 → Storage error
2	Warning signals	16 bit string	20-21	Byte 21 Bit5=1→ Buffer battery down
2	Supported warning signals	16 bit string	22-23	Byte 23 Bit5=1→ Buffer battery down
2	Profile version	Word	24-25	0110H (Encoder profile 1.10)
2	*Software version*	Word	26-27	01xxH (1.xx)
2	Operating time	Unsigned 32	28-31	Time in hours/10 since the latest reset
2	Offset	Unsigned 32	32-35	Offset of the preset value
2	Manufacturer offset	Unsigned 32	36-39	Not supported
2	Steps per revolution	Unsigned 32	40-43	1 to 8192
2	Total resolution	Unsigned 32	44-47	1 to 8192 (single turn) 1 to 536870912 (multiturn)
2	Serial number	ASCII string	48-57	Not supported, all characters correspond to '*' (2AH)
2	Reserved data	Word	58-59	Not supported, reserved for future purposes
2	Manufacturer's specific data	Unsigned 32	60-63	Preset value (Software version 1.02 and following) 0 to 8191 (single turn) 0 to 536870911 (multiturn)

7.3 Exchange of process data

The Data_Exchange status is the normal operating status of the system. Besides transmitting the position value, the encoder (either of Class 1 or of Class 2) can receive the preset value from the Master.

During the data exchange, the Slave can signal a diagnostic event. The Master then requests the diagnostic data and the information about the Slave status by means of the telegram Slave_Diag.

When the encoder is in the Data_Exchange status its green LED is lighted steadily.

7.4 Preset function

The preset function allows to assign a defined value to a definite mechanical angular position of the encoder shaft. The position value to be considered as origin is defined by the “preset” value.

The preset value must lie within the overall measuring range; in particular:

- disabled scaling function → preset value < total physical resolution
- enabled scaling function → preset value < total programmed resolution

To ensure optimum coordination between the mechanical position and the preset value, the preset value should only be set when the encoder is at a standstill. The preset value is automatically stored immediately after its reception.

The preset value is transferred to the encoder in the message sent from the Master to the Slave in the Data_Exchange status. The control system transmits the value at least twice: the first time with the more significant bit high (MSB = 1), then with the most significant bit low (MSB = 0). In this way, the MSB acts in a way as a "clock" bit. For this reason, the transmitted preset value is limited to the value range up to 31 bit.

The first transmission is authoritative in determining the time of acceptance.

Example: Zeroing the encoder (preset value = 0)

1. The Master transmits 80000000H
2. The Master transmits 00000000H

The encoder calculates the offset value, that is the differential between the current position and the preset value. This value generally has no bearing on the application, but can be read out among the diagnostic data. The offset value is stored in the buffer memory.

8. Parameter entering

The following parameter data are stored in the GSD file in the form of 32-bit values (double words, format "unsigned32"):

- Total resolution

Many configuration programs for PROFIBUS Masters (including also Step7 from Siemens or WinPLC7) do not support this format for parameter input. Therefore the 2 words composing these data (16 bit higher →“high block” and 16 bit lower → “low block) must be entered separately, and in decimal form.

For values beneath 65535 (16 bit), it is just necessary is to force the block "high" = 0 and to set the parameter directly in the "low" block.
Parameters greater than 65535 (16 bit), must be separated beforehand using the formula described below and then recalculated. A calculator with hexadecimal function of the type provided among the "Windows accessories" is helpful here.

- Conversion of the required parameter value from the decimal format into hexadecimal format
- Subdivision of the hexadecimal value into two blocks, "high" and "low". The block length in each case is two words
- Conversion of the hexadecimal format of the two blocks "high" and "low" back into decimal format
- Input into the input mask using the decimal format

In any case the total measuring range shall be calculated multiplying the “measuring units per revolution” by the “number of revolutions” (1 to 65536)

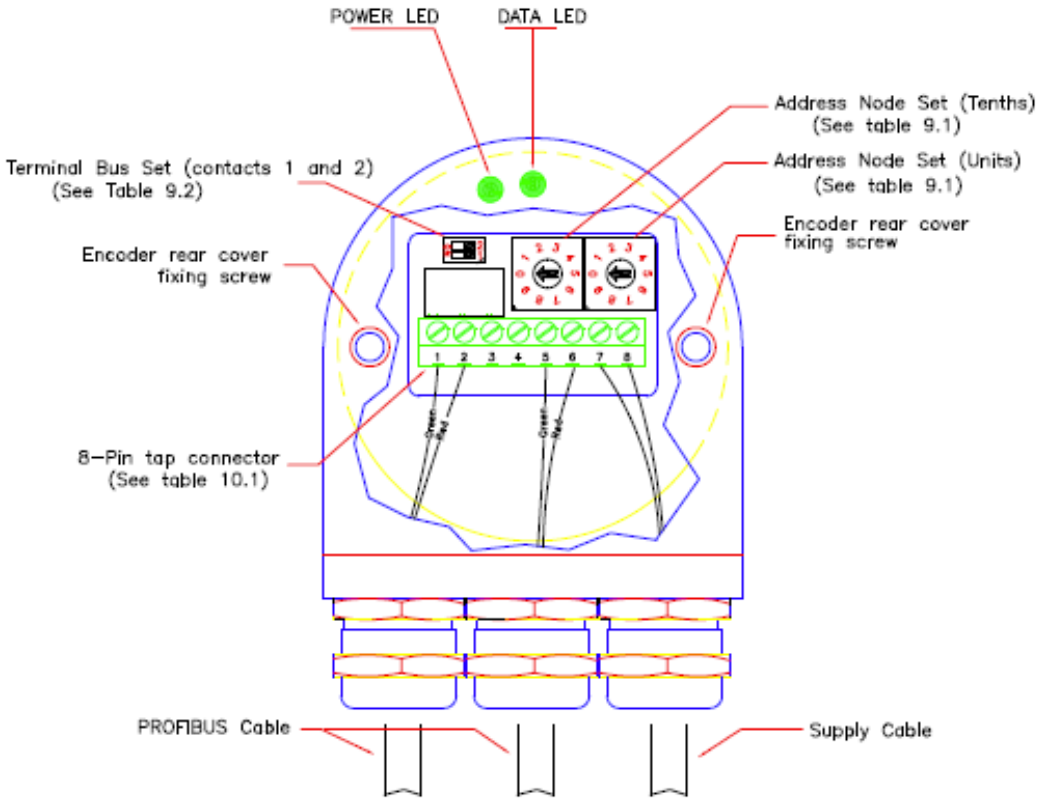
Example

Total resolution	3600 steps per revolution x 256 revolutions	921600
Conversion into hexadecimal format		E1000H
High block		000EH
Conversion into decimal format		14
Low block		1000H
Conversion into decimal format		4096
Total measuring range (high)		14
Total measuring range (low)		4096
Measuring units per revolution	3600	3600

9. Hardware configuration

The encoder rear cover must be removed by unscrewing the fastening screws, to gain access to two rotary switches, one 4-pin DIP switch and one 8-pin tap connector (Picture 9.1).

The 8-pin tap connector can be disconnected and is supplied inserted in the corresponding plug connector.



Picture 9.1

Setting the user address (Node ID)

The node ID (user address) can be set by means of the two rotary switches of the encoder (see TABLE 9.1). The max. set is 99.

If the switches are set at 0, at power on the encoder keeps as node number the default value (10).

The default set of the two switches is 10.

TABLE 9.1
ADDRESS NODE SET

TENTHS UNITS	EXAMPLE NODE ID=4
	EXAMPLE NODE ID=28

Terminating resistor

If the connected encoder is the last device in the bus line, the bus must be terminated with a resistor. The resistor can be connected by the contacts 1 and 2 of the encoder DIP switch (see TABLE 9.2).

The default set of the DIP switch contacts 1 and 2 is: OFF.

TABLE 9.2
DIP SWITCH SET (Termination enable/disable)

Contacts 1 and 2 = ON : Termination enable
Contacts 1 and 2 = OFF : Termination disable

10. Connections

The bus and supply cables must be connected to the 8-pin tap connector as shown in the Picture 9.1 and in the TABLE 10.1.

The pins mentioned with the same indication in the table 10.1 are common inside the encoder.

The following procedure is recommended to connect the cables to the encoder:

- Unfasten and remove the encoder rear cover
- Arrange the cables as shown in the Picture 6.1 and fasten them in the relevant nuts in the cover
- Unplug and wire the 8-pin tap connector

TABLE 10.1
PIN NAME 8–PIN CONNECTOR

PIN N°	NAME	DESCRIPTION
1	A	PROFIBUS SIGNAL A
2	B	PROFIBUS SIGNAL B
3	+V	+ SUPPLY 5/28Vdc
4	GND	GND
5	A	PROFIBUS SIGNAL A
6	B	PROFIBUS SIGNAL B
7	+V	+ SUPPLY 5/28Vdc
8	GND	GND

Shielding

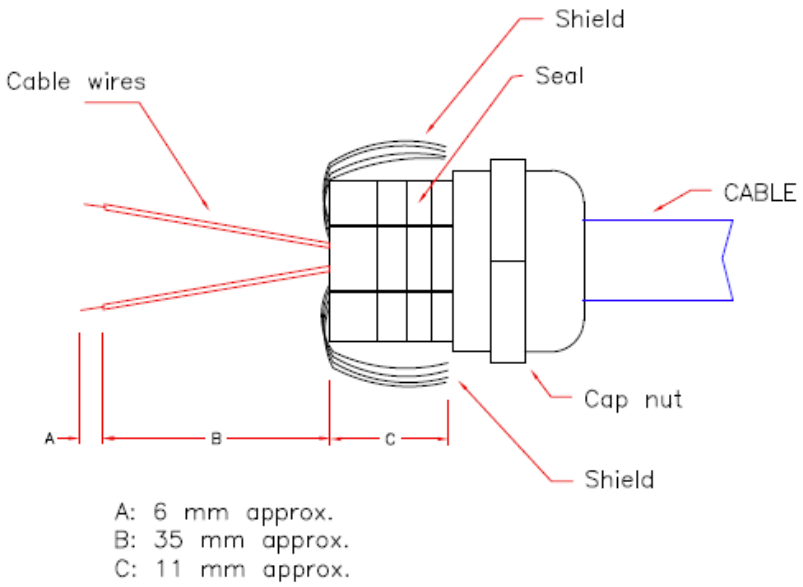
As the encoder is not always connected to a defined earth potential depending on its mounting position, the encoder flange should always be additionally connected to earth potential.

The encoder should always be connected to a shielded conductor. If possible the cable shield should be placed at both ends. Ensure that no equalizing currents are discharged via the encoder.

The Picture 10.1 shows the correct way a cable should be connected to the encoder.

Bend the shield and place it all around the plastic cylinder containing the cable gland sealing gasket.

Insert the cylinder in the relevant cap nut and screw the metal cap.



Picture 10.1

10.1 LED indication (status display)

Two LEDs are integrated at the back of the bus cover.

- Green LED (POWER): directly connected to power, it indicates if the encoder is electrically supplied or not.
- Green LED (DATA): it indicates the PROFIBUS communication status.
    - Green alight: the Encoder is in "Data_Exchange" mode
    - Green flashing: Configuration or parameterization error
    - Green off: disconnected Bus

11. Technical Specifications

Mechanical & Environmental Specifications

	MEM520-Bus	MEM540-Bus	MEM620-Bus	MEM410-Bus MEM450-Bus
	Ø 58 mm round flange servo coupling SIZE23	Ø 58 mm round flange Ø.36 mm centering mask	mm 63.5x63.5 square flange SIZE25	Hollow shaft for motor shaft coupling
Weight	Ca. 500 g			
Materials: case *Shaft*	aluminium stainless steel			
Shaft diameter	6, 8, 10 mm			Hole Ø 8, 10, 12, 14, 15 mm
RPM	6000			
Starting torque	≤0,8Ncm			
Inertia	≤25g cm2			
Max load	80 N axial/100 N radial			
Shock resistance (11 ms)	50 G			
Vibrations resistance (10÷2000 Hz)	100 m/sec^2			
Protection degree	IP65			
Operating temperature	-30 ÷ +70°C			
Stocking temperature	-30 ÷ +85°C			

Electrical & Operating Specifications

Operating principle	magnetic
Resolution/revolution	8192 steps/rev. – 13 bit
Number of revolutions (multiturn type)	65536/16 bit
Initialization time	< 1 s
Data memory	>13 years *
Fieldbus Interface	Profibus DP
Supply	5 ÷ 28 Vdc Protection against polarity reversal
Power consumption (disconnected channels)	2 W
Accuracy	± ½ LSB
Connection outlet	2 cable glands or 3 cable glands
Interference Immunity	EN 61000-6-2
Emitted Interference	EN 61000-6-4
**Rotating the shaft during power off decreases the data retention time*	

Ordering Information

MEM520 | **PDP** | **M** | **10** | **3P**

TYPE
MEM520-Bus = *58 mm diameter round flange*
MEM540-Bus = *58 mm diameter round flange*
MEM620-Bus = *63.5x63.5 mm square flange*
MEM410-Bus = *Hollow shaft for motor coupling*
MEM450-Bus = *Hollow shaft & antirotational support*

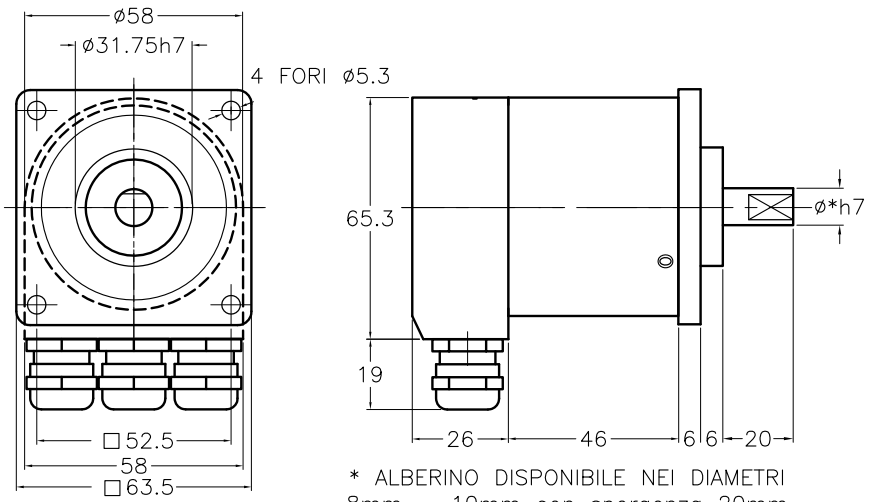
FIELDBUS INTERFACE
PDP= *Profibus DP V0*

REVOLUTIONS NO
M = *Multiturn*
S =Singleturn

SHAFT DIAMETER/JOINT HOLE
6 – 8 - 10 - 12 – 14 – 15 mm

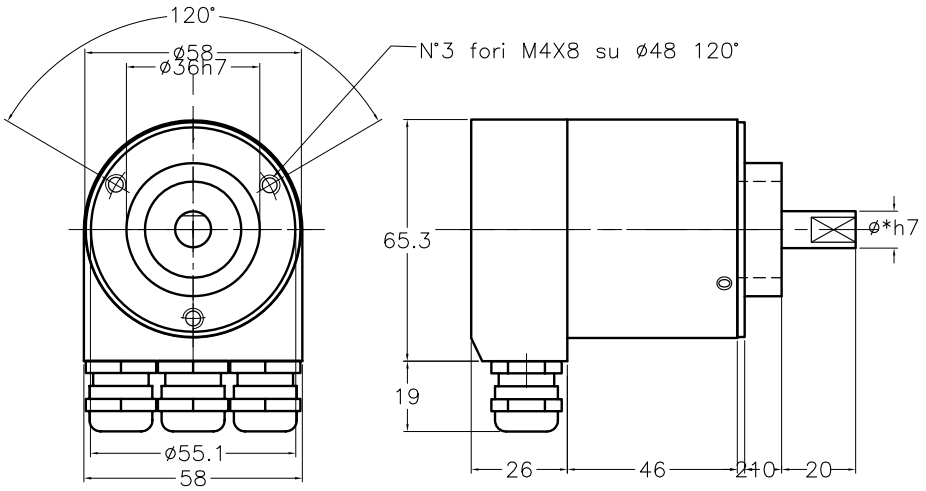
CONNECTIONS OUTLET
3P = *3 cable glands*
2P = *2 cable glands*

MEM620Bus



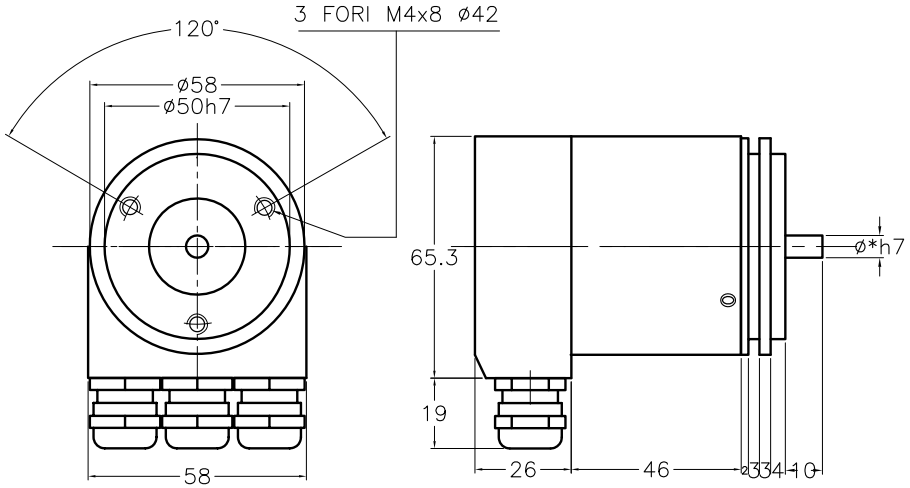
* ALBERINO DISPONIBILE NEI DIAMETRI
8mm – 10mm con sporgenza 20mm
6mm con sporgenza 10mm

MEM540Bus



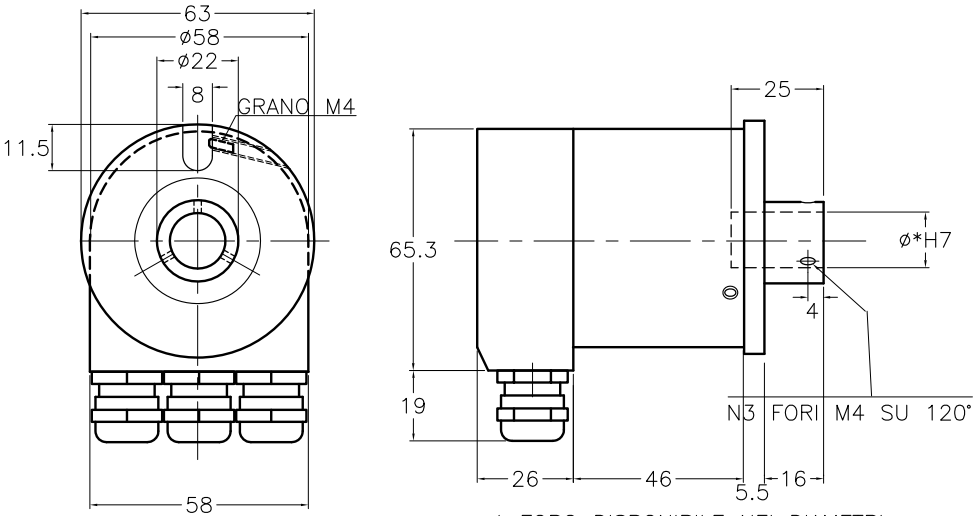
* ALBERINO DISPONIBILE NEI DIAMETRI
8mm – 10mm con sporgenza 20mm
6mm con sporgenza 10mm

MEM520Bus



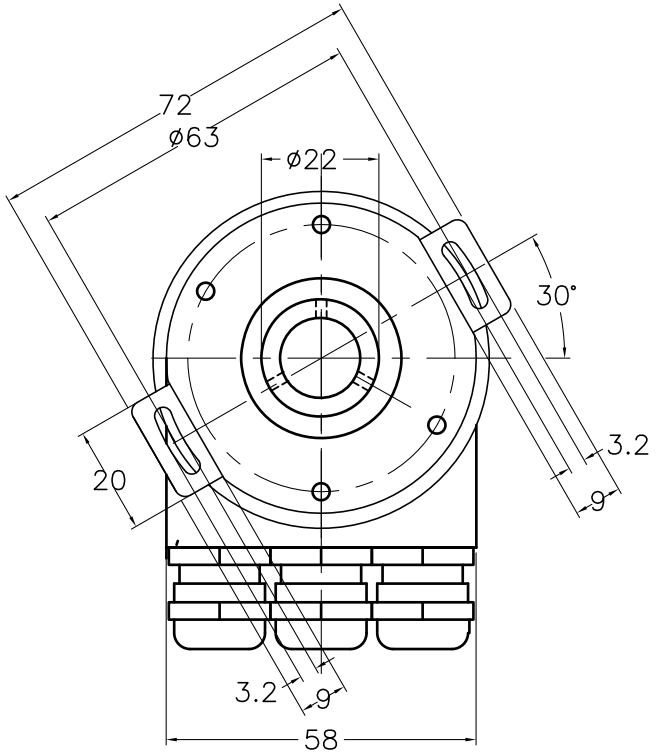
* ALBERINO DISPONIBILE NEI DIAMETRI
8mm – 10mm con sporgenza 20mm
6mm con sporgenza 10mm

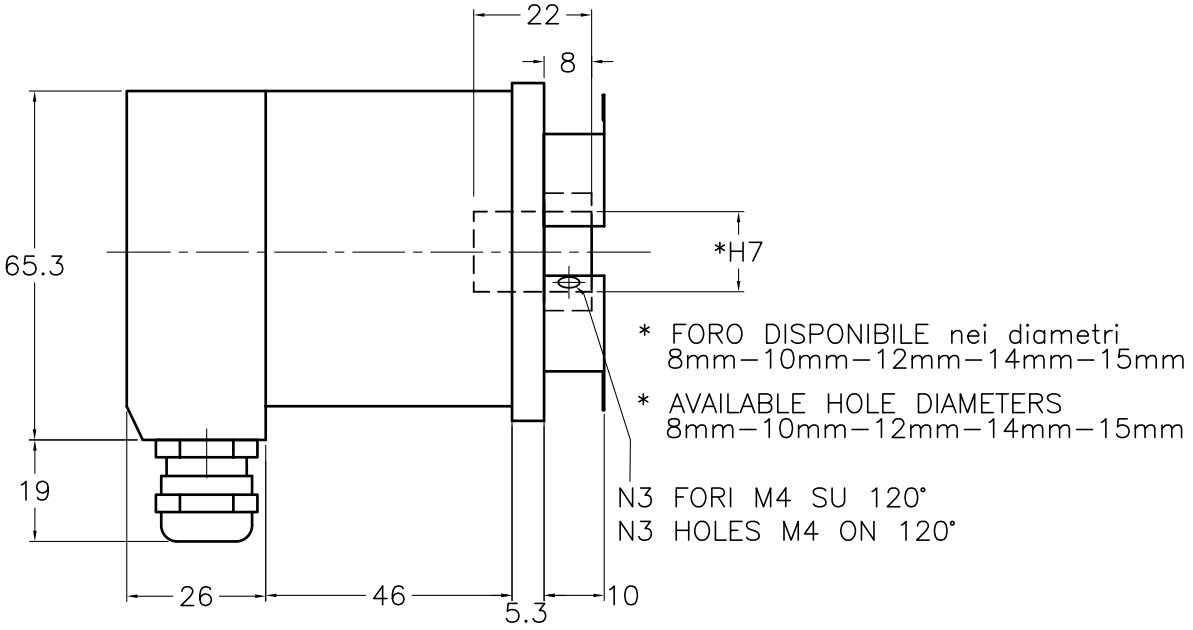
MEM410Bus



* FORO DISPONIBILE NEI DIAMETRI
8mm – 10mm – 12mm – 14mm – 15mm

DISEGNO N. M1395V	CODICE	SCALA 1:1	FOGLIO 1 di 1	SOSTITUITO DA	DATA	FIRMA	DISEGNATO T.R.	DATA 20.4.09	SOFTWARE	
DENOMINAZIONE: ENCODER MEMCANopen DIMENSIONI D'INGOMBRO ENCODER CON USCITA SERRACAVO		TOLL. ±0.1	MATER.	SOSTITUISCE	DATA	FIRMA	VISTO	FILE		
NOTE		MODIFICHE	DESCRIZIONE		DATA	FIRMA	elap SPA			
CLIENTE							VIA VITTORIO VENETO, 4 20094 CORSICO (Milano) TEL. 0245519561 FAX. 0245103406			





DISEGNO N.	CODICE	SCALA	FOGLIO	SOSTITUITO DA	DATA	FIRMA	DISEGNATO	DATA	SOFTWARE
M2048			1 di 1				T.R.	27.10.2017	

DENOMINAZIONE	TOLL.	MATER.	SOSTITUISCE	DATA	FIRMA	VISTO	FILE
MEM450B Dimensione d'ingombro con molla di fissaggio Profibus e CanOpen	V.note						M2048.DWG

MODIFICHE	DESCRIZIONE	DATA	FIRMA

NOTE

CLIENTE

elap

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REFERENCES

MANUALS, SOFTWARE and DIMENSIONAL DRAWING DOWNLOAD AT:

https://www.elap.it/absolute-encoders/encoder-mem-bus-profibus/

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