

TBF-ETHERCAT IO OUTPUT USER MANUAL

Magnetostrictive Sensor



TBF-ETHERCAT magnetostrictive transducer implements Ethercat IO communication.

Ethercat is a digital communication standard developed and maintained by ETG.

The digital communication allows the transfer of data between the device (the TBF-ETHERCAT transducer) and the Master (PLC) through a network.

These data are:

Process data, such as position, speed, and status of the device

Acyclic data, such as parameterization, statistic, and diagnostic data

The E-CATNet standard provides a descriptor file called XML .



This file allows clear identification of the device and comprehension of data provided and exchanged.

Please refer to TBF website for the download of XML files.

This manual is not designed to describe the “ETHERCAT” Fieldbus, as it is presumed the user is familiar with the same and will refer to any updates are required to the above-mentioned standard or the official ETHERCAT International website(ETG) .

2 Introduction and electrical connections

2.1. General precautions

The system must be used only in accordance with the required protection level.

The sensor must be protected against accidental knocks and used in accordance with the instrument's ambient characteristics.

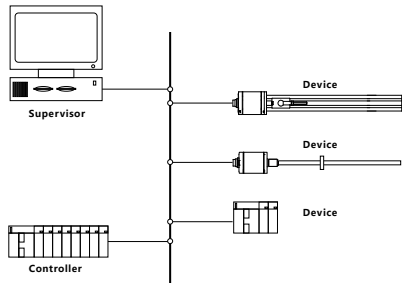
The sensors must be powered by non-distributed networks.

2.2. Electrical installation

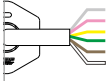
The transducer must be grounded (normally through the machine body or equipment it is installed on).

Connect cables shielding to ground at the cabinet side (control equipment or PLC).

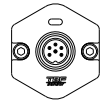
To prevent interference, separate the power cables from signal cables.



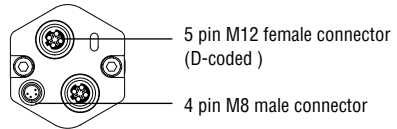
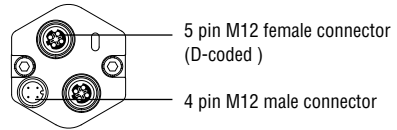
2.2.1 Straight out cable

6 pin M16	PIN	Color	Function
	1	Gray	TX-
	2	Pink	TX+
	3	Yellow	RX+
	4	Green	RX-
	5	Brown	+24VDC(-15/+20%)
	6	White	GND

2.2.2 Single Circular Connector

6 pin M16	PIN	Color	Function
	1	Pink	TX+
	2	Yellow	RX+
	3	Gray	TX-
	4	Green	RX-
	5	Brown	+24VDC(-15/+20%)
	6	White	GND

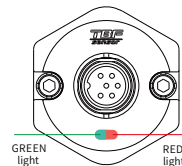
2.2.3 Three Aviation Connector Connection



5 pin M12 (D-coded)		PIN	Color	Function
		1	Yellow	TX+
		2	White	RX+
		3	Orange	TX-
		4	Blue	RX-
		5	-	NC
4 pin M12	4 pin M8	PIN	Color	Function
		1	Brown	+ 2 4 V D C (- 15/+20%)
		2	-	-
		3	Black	GND
		4	-	-

2.3. Status LEDs

The built-in LED indicator light provides basic fault feedback and fault alarm of the sensor.



Green light	Red light	Function
ON	OFF	View on sensor
ON	ON	Magnet cannot be measured, nor magnet number is correct.
OFF		Communication exception

3 Main communication features

Ethernet Baud Rate	Max 100 Mbit/s
Data Transport Layer	Ethernet II, IEEE 802.3
ECAT IO version	1.7
Real-time Communication	DC
Profile	General (Manufacturer) Profile
Encoder Profile v 4.2 Class 4	Communication exception
Min Device Interval	1 ms (DC)
Address	Discovery and Configuration Protocol
(DCP)	Communication exception
Default Name	TBF

4 Main communication features

4.1 Input data

Content	DI Inputs	Aplication
1	Status(2 bytes)	Read-back parameters
2	Position(4 bytes)	Magnet position

- Generally 1 μm /5 μm resolution of position

4.2 Output data

Content	DO Inputs	Aplication
1	Set(2 bytes)	Setting Parameters
2	Value(4 bytes)	Setting Parameters

5 Example of PLC configuration

Implementation and configuration of T3.0 EtherCAT® with TwinCAT 3

5.1 General information

This instruction describes as an example the implementation and configuration of a TBF T3.0 sensor with EtherCAT® in TwinCAT 3 (The Windows Control and Automation Technology) from Beckhoff Automation GmbH & Co. KG. In principle, you can integrate the sensor into an EtherCAT® network using any EtherCAT® compatible software and hardware.

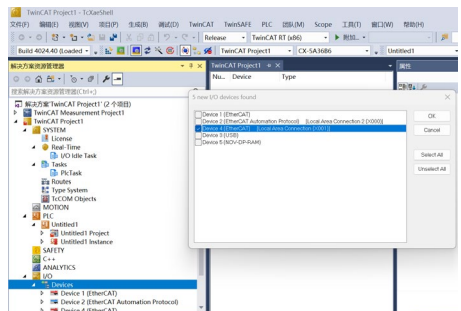
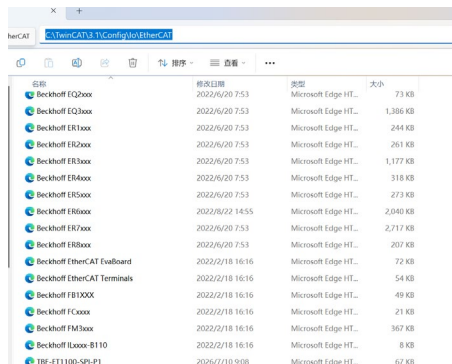
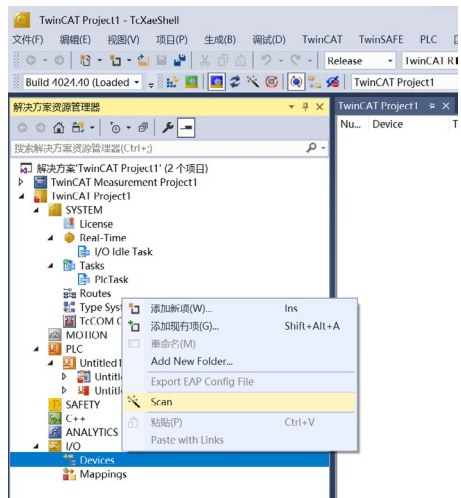


Follow the information given in the controller operation manual.

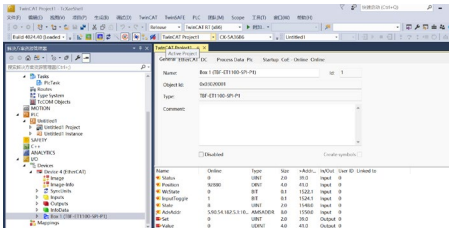
5.2 Implementation of T3.0- EtherCAT® in TwinCAT 3

In order to integrate T3.0- EtherCAT® into TwinCAT 3, you must first provide the ESI file of the sensor for TwinCAT 3. An ESI file (EtherCAT Slave Information) describes the properties and functions of an EtherCAT® slave. The ESI file, which is based on XML, contains all relevant data that are important both for the implementation of the device in the controller and for data exchange during operation. The ESI file of the T3.0- EtherCAT® is packed in a zip file which is available for download on our homepage www.tbfsensor.com. Download the ESI file and save it on your computer. To include the ESI file in TwinCAT, unpack the file and place the XML file in the TwinCAT 3 installation directory in the "Config\Io\EtherCAT" subdirectory.

Then start TwinCAT 3. If you have stored the ESI file in the installation directory when TwinCAT is already running, you can make the device description file known to TwinCAT later. To do this, shows the TwinCAT user interface in configuration mode (Config mode) after a project has been created and a master integrated. You can implement a slave such as the T3.0- EtherCAT® by selecting in the Solution Explorer in the tree the entry "I/O > Devices > Devices 1 (EtherCAT)". A right mouse click opens a menu. In this menu click the entry "Scan...". TwinCAT then searches for slaves in the network. In EtherCAT® this process is known as "Scan for boxes"



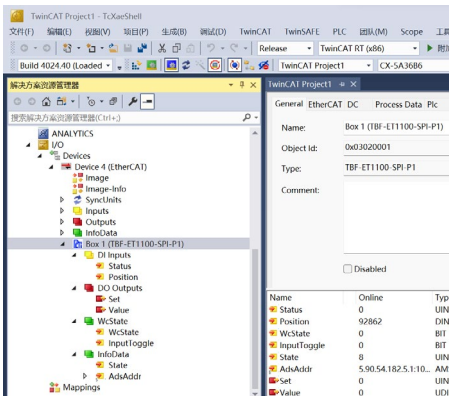
the T3.0- EtherCAT® sensor is found in the network as “Box 1” with the name “TBF-EP1100-SPI-P1”. If you have previously assigned the ESI file of the T3.0- EtherCAT® in the TwinCAT installation directory, TwinCAT can correctly assign this slave as “TBF-ER1100-SPI-P1 V”



If you expand the entry “Box 1” in the tree of the Solution Explorer, the variables for Magnet are displayed. In this example the sensor is operated with one magnet. For this magnet the following values are displayed as in the main window:

- DI Inputs
- DO Outputs

The WcState and InfoData values are described in the TwinCAT operation manual. The sensor is now implemented and ready for use.

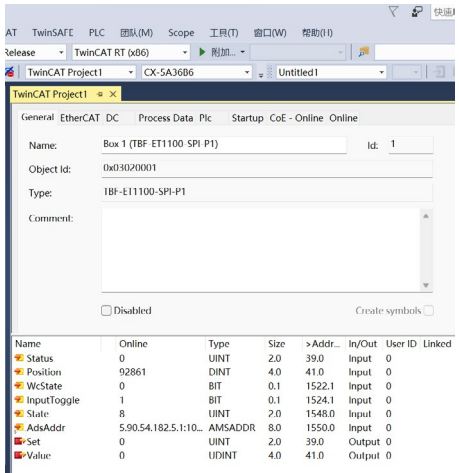


5.3 Configuration of T3.0- EtherCAT® in TwinCAT 3

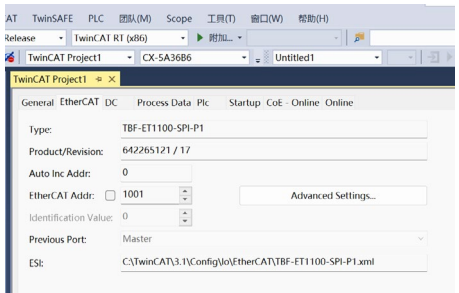
Various tabs are available in the main window of the TwinCAT user interface for configuring the sensor:

5.3.1 The tab General

In the tab “General” the name of the device can be changed. For example, you can assign an application-specific name

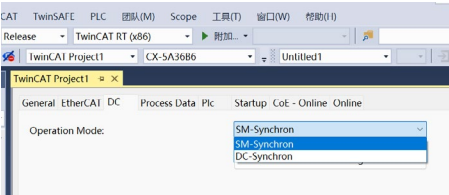


The tab “EtherCAT” shows EtherCAT® specific settings



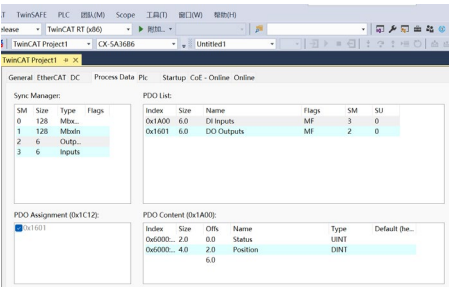
5.3.2 The tab DC

In the tab “DC” you can set the mode in which the sensor should be operated in normal operation



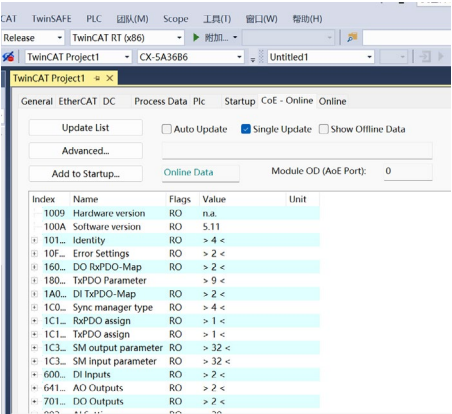
5.3.3 The tab Process Data

The tab “Process Data” is used to configure process data of the sensor. As shown in Fig. 115, in this example the sensor is assigned to the Sync Manager “SM 3” and has a size of 14 bytes. The value of 14 bytes results from 2 bytes for the status and 4 bytes each for position, velocity and acceleration, as shown in the lower part of the main window. As shown in the “PDO Assignment” area, only the entry “0x1A00” is active. This is because the sensor is operated with one magnet. Accordingly, only “Magnet 1” is assigned to a Sync Manager in the “PDO List”, in this case to “SM3”



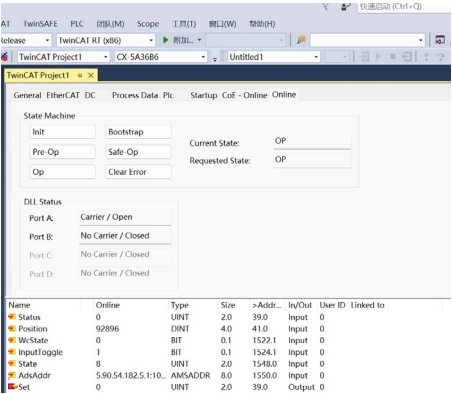
5.3.4 The tab CoE - Online

The T3.0-EtherCAT® supports the “CAN application protocol over EtherCAT® (CoE)” communication profile. Therefore, in the tab “CoE - Online” the parameters of the sensor are displayed with the respective values. According to the name of this tab the object structure is similar to CAN (Controller Area Network). Parameters with the attribute (“Flag”) RO can only be read, while parameters with the attribute (“Flag”) RW can be read and adjusted.



5.3.5 The tab Online

In the tab “Online” you can set the sensor specifically in different modes and check the current status. For further information see the TwinCAT operation manual.



For information on creating a program and transferring the program from the engineering environment to the runtime system see the TwinCAT operation manual.

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