UNIMOTION

STDF EC Workspace
Closed Loop Stepping System Manual

TABLE OF CONTENTS

1 How to install 4

1.1 Installing the program ... 4

2 Getting started 6

2.1 Connect the USB cable ... 6
2.2 Install the USB device driver ... 6
2.3 Executing the program ... 6
2.4 Connect ... 7
2.5 Check the COM port number ... 8

3 Windows 9

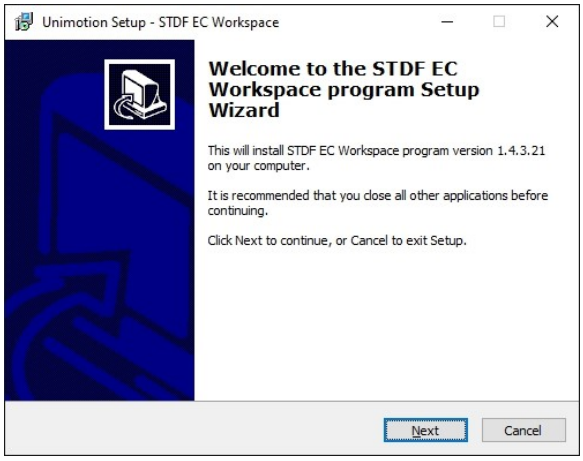
3.1 Main window ... 9
3.1.1 Menu ... 9
3.1.2 Output window ... 10
3.2 Motion test ... 11
3.3 Alarm history ... 12
3.4 EtherCAT status monitoring ... 13
3.4.1 State machine ... 13
3.4.2 Mode of operation ... 14
3.4.3 Error code ... 14
3.4.4 Related objects ... 16
3.4.5 Control word ... 16
3.4.6 Status word ... 17
3.4.7 Digital inputs ... 18
3.4.8 Digital outputs ... 19
3.5 Ethercat parameter ... 19
3.5.1 Ethercat parameter menu ... 20
3.6 EtherCAT object dictionary ... 21
3.7 EtherCAT PDF Mapping ... 22

1 HOW TO INSTALL

1.1 Installing the program

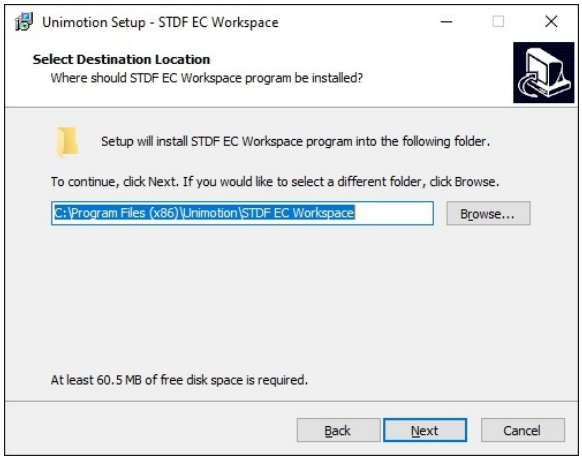
Execute Network Setting Setup program.

Click the "Next" button.



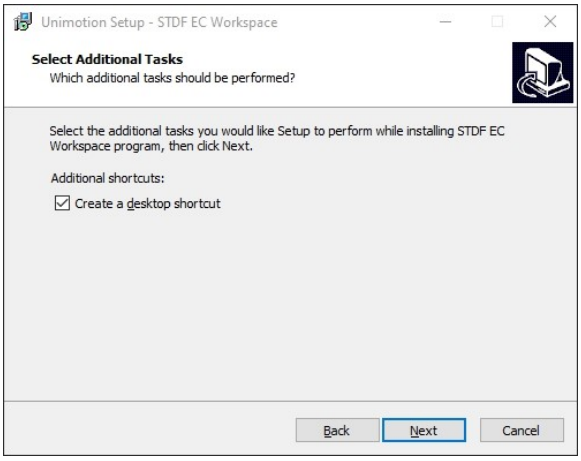
Select the folder to install.

Click the "Next" button.



Choose whether to create a shortcut on the desktop.

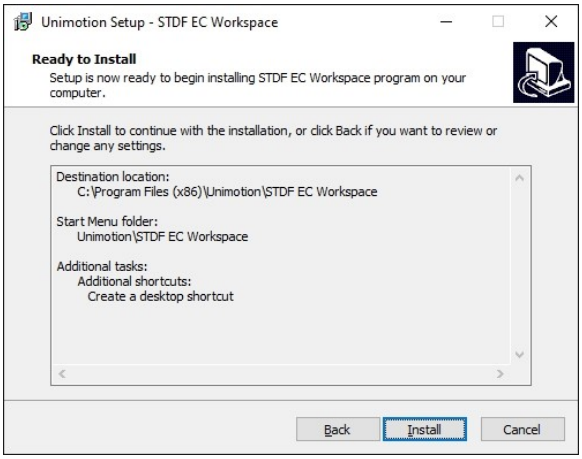
Click the "Next" button.



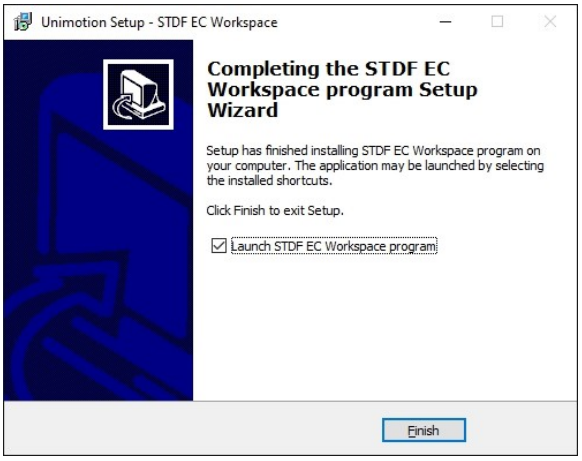
Ready to install now.

Confirm the installation path, etc.

Click 'Install' button.



Installation was complete.

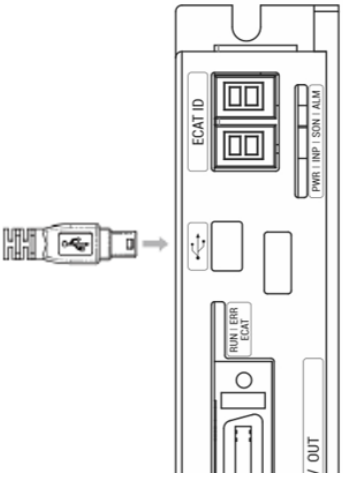


2 GETTING STARTED

2.1 Connect the USB cable

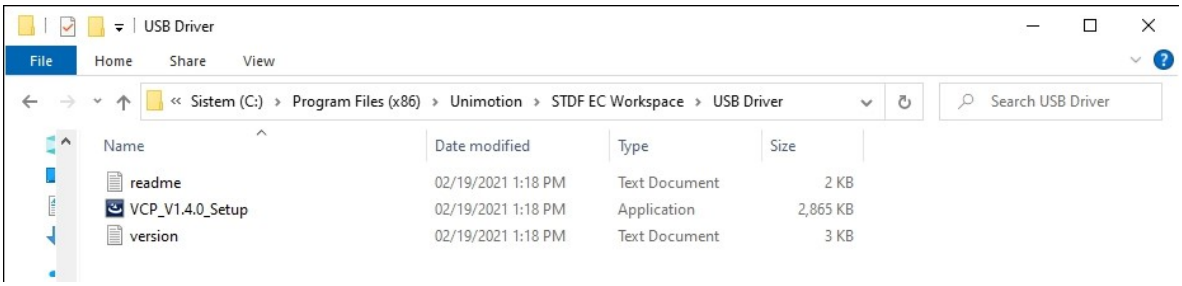
Apply power to the product. Then, connect USB cable to the product's USB connector and connect the other side to the PC.

Use a standard USB 2.0 Mini-B (5-pin) cable.



2.2 Install the USB device driver

If the USB Device driver is not installed, the USB device of the product may not be recognized. Please install the USB driver in the folder where the program is installed.



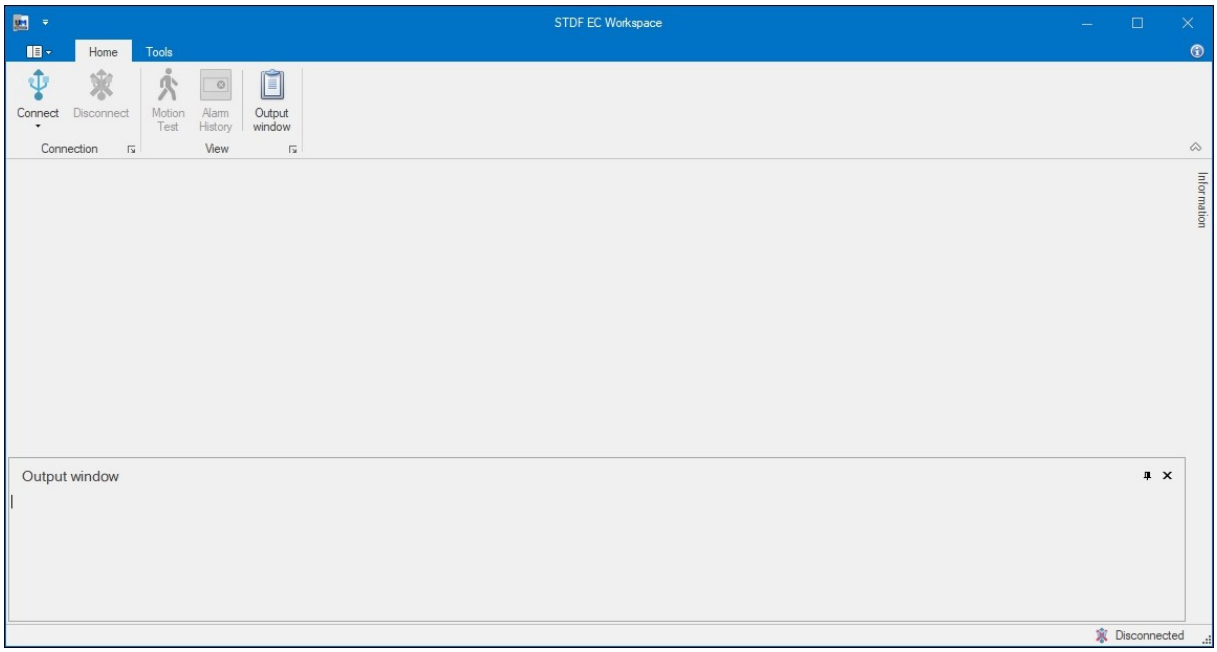
2.3 Executing the program

Click the 'STDF EC Workspace' icon to run the program.

STDF EC Workspace

2.4 Connect

Before trying to connect, please check that the USB cable is connected to the product and the product is powered on.

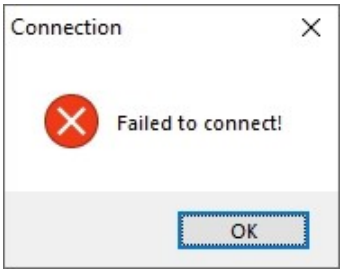


Try to connect by clicking Connect in the Main Menu. The program automatically searches all COM ports on the PC to find the product.

If two or more products are connected to the PC or the connection failed due to unexpected behavior of some COM ports, you can connect a specific COM port by clicking the arrow under Connect button.

If the connection is successful, a message “Device was connected.” Is displayed in the Output window, and the **EtherCAT STATUS MONITORING** window and **EtherCAT PARAMETER** window are displayed.

If the connection fails, a message box stating that the connection has failed is displayed.



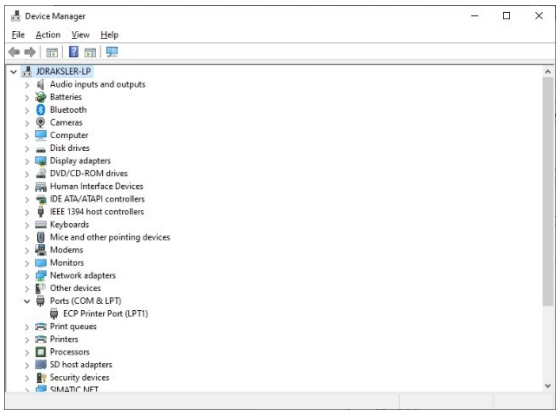
If the connection fails, please check the following.

1. Check if the product is powered on.
2. Make sure that the USB cable is connected to the product and the other side is connected to the PC.
3. Check if the Network Setting program is already running and connected to the same COM port.
4. Try connecting by clicking the arrow below the Connect button to select the specific COM port to which the product is connected.

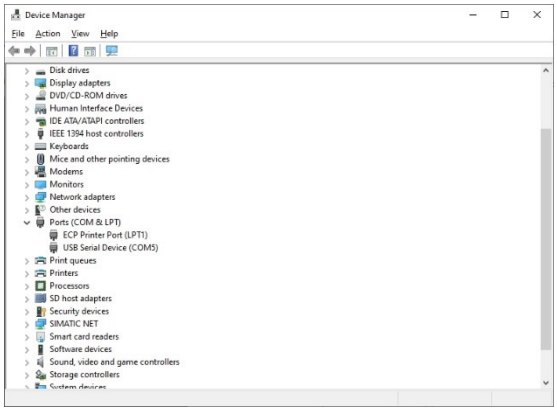
2.5 Check the COM port number

Connection in the STDF EC Workspace program may fail due to two or more products connected to the PC via USB cable, or due to any USB-to-Serial product. In this case, you can select and connect one COM port. To do this, you need to know the number of the COM port the product is connected to.

When USB cable is connected to the product, the connected COM port number can be checked through the Windows Device Manager. When USB is connected to the product, you can see that the newly added COM device under Ports (COM & LP) is the COM port of the product. However, the name of the COM device may differ depending on the USB device driver installed.



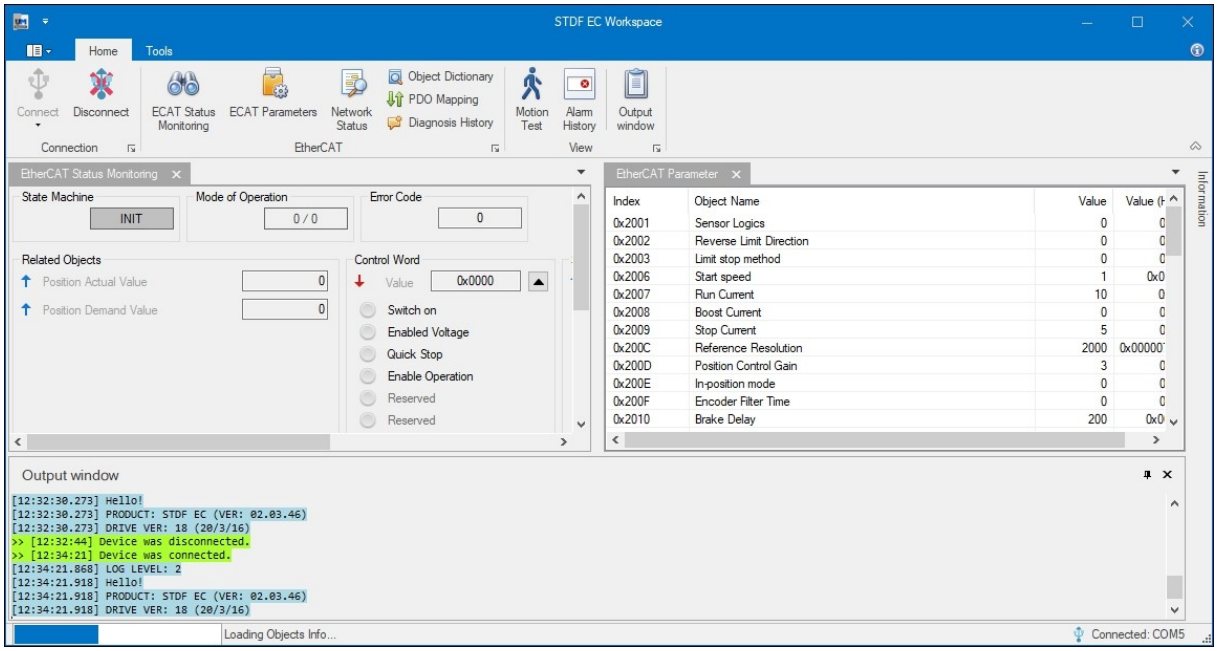
Before connection



After connection

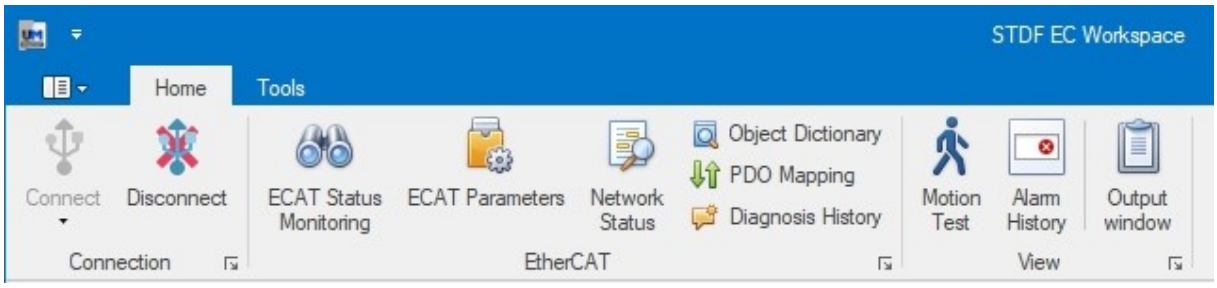
3 WINDOWS

3.1 Main window



This is the main window of the program. The MENU that can display the supported window is at the top and the OUTPUT WINDOW where important log messages related to product operation are displayed at the bottom.

3.1.1 Menu



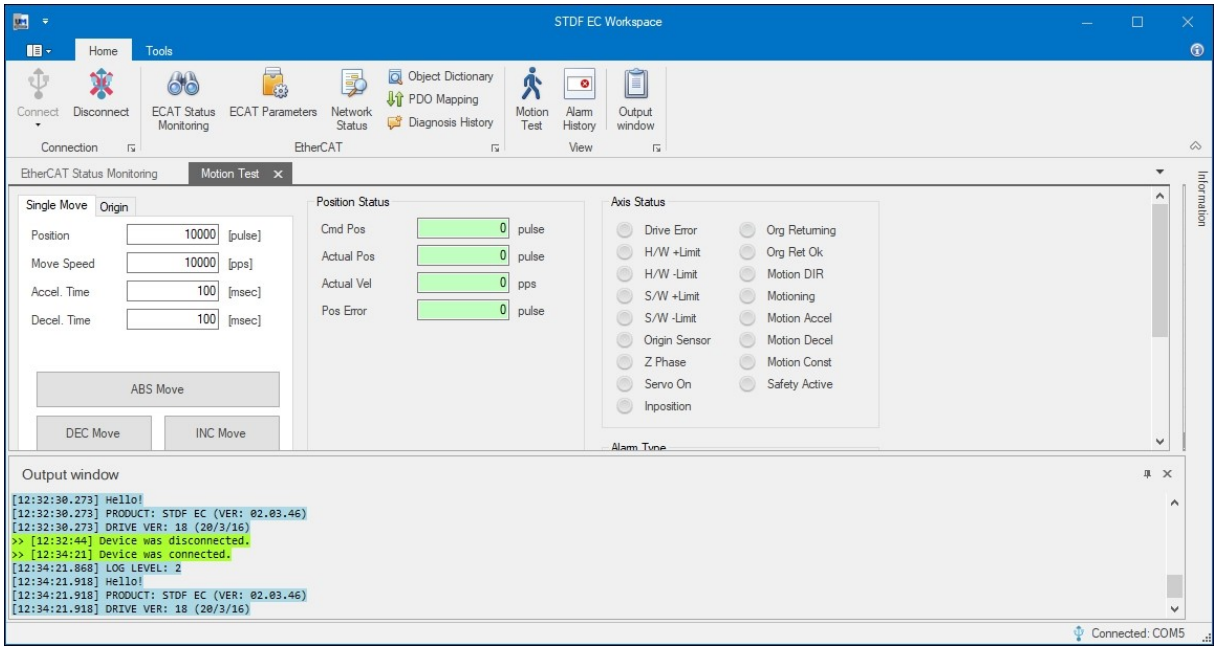
Icon	Name	Description
	Connect	Try to connect the product.
	Disconnect	Disconnects the currently connected USB communication.
	ECAT Status Monitoring	Displays the **EtherCAT STATUS MONITORING** window which you can check the data exchanged with the EtherCAT Master.

	ECAT Object Dictionary	Displays the **EtherCAT OBJECT DICTIONARY** window which you can see the list of EtherCAT Objects and values of the product.
	ECAT Parameter	Displays the **EtherCAT PARAMETER** window which you can check and set the product parameters.
	ECAT PDO Mapping	Displays the **EtherCAT PDO MAPPING** window which can confirm the PDO mapping value of the product.
	Motion Test	Displays the **MOTION TEST** window to operate the product without control from the EtherCAT Master.
	Alarm History	Displays the **ALARM HISTORY** window where you can check the record of alarms that have occurred in the product so far.
	Output window	Displays the **OUTPUT WINDOW** where you can check the logs that occur during communication with the product.

3.1.2 Output window

In the **OUTPUT WINDOW**, you can check important log messages related operation of the product that occurs during communication.

3.2 Motion test

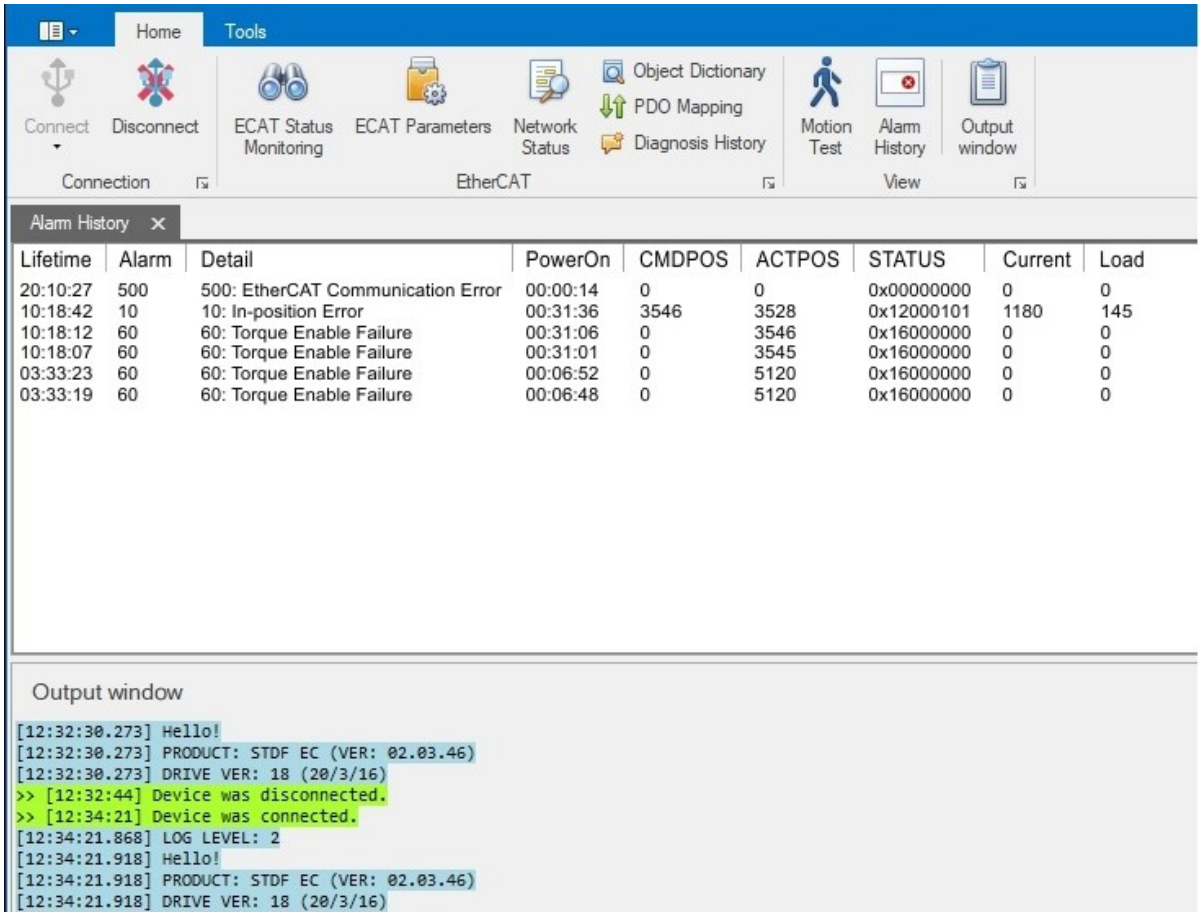


On the **MOTION TEST** window, you can check the current status of the product and operate the motor through USB communication.

When the EtherCAT communication state (State Machine) is OP or **SAFE-OP**, you cannot execute any command on the **MOTION TEST** window. Please use the **MOTION TEST** window when the product is in any other communication state.

When a command is called or a value is changed in the **MOTION TEST** window, some EtherCAT Object values may also be changed. The user's unintended change of the value of the EtherCAT Object may cause different results in the subsequent operation of the product. After testing the product through the **MOTION TEST** window, it is recommended to turn the product off and on before controlling it through the EtherCAT Master.

3.3 Alarm history



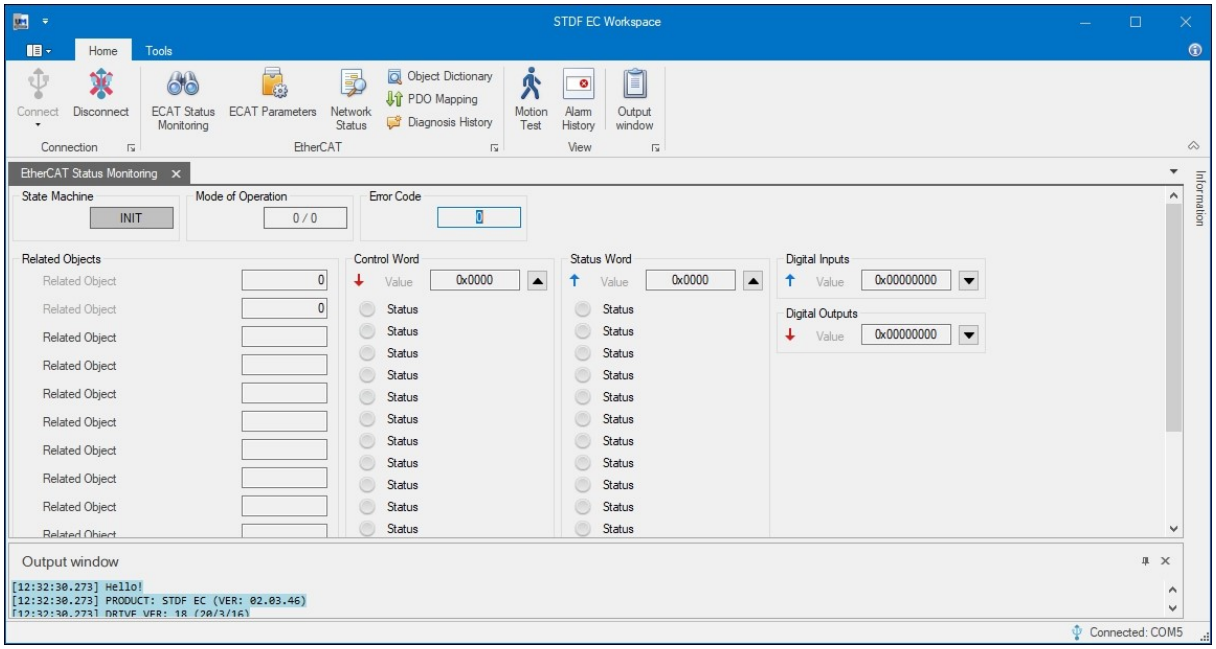
In **ALARM HISTORY** window, you can check the record of the alarms that have occurred in the product so far.

Parameter	Description
Lifetime	Lifetime value when an alarm occurs.
Alarm	The type of alarm that has occurred.
Detail	The name of the alarm.
PowerOn	It is the elapsed time until the product is powered on and an alarm occurs.
CMDPOS	This is the command position value when an alarm occurs.
ACTPOS	This is the encoder position value when an alarm occurs.
Status	This is the internal status value when an alarm occurs.
Current	This is the current information that was being input to the motor when the alarm occurred.
Load	This is the information of the load ratio [%] applied to the motor when an alarm occurs.

The values of Lifetime and PowerOn are in units of time and are displayed in the format [Date].[Hour]:[Minute]:[Second].

You can delete all alarm history by clicking Delete All in the pop-up menu.

3.4 EtherCAT status monitoring

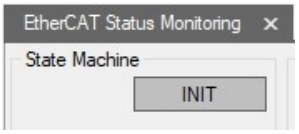


On the **EtherCAT STATUS MONITORING** window, you can check the EtherCAT communication status of the product and the values of objects exchanged with the EtherCAT Master in realtime.

Please note that some object values may not be updated and previous data may be displayed depending on the EtherCAT communication state (State Machine).

3.4.1 State machine

It displays the current product's EtherCAT State Machine (EtherCAT communication status) and has INIT, PRE-OP, SAFE-OP, OP, and BOOT stages.

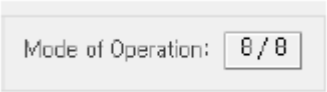


The values of objects displayed on the **EtherCAT STATUS MONITORING** window are updated through communication with the EtherCAT Master. Depending on the communication status, the values of some objects are not updated, so the previous value rather than the current value may be displayed.

Mode	Object representing the state	Object delivered from Master
BOOT		
INIT		
PRE-OP		
SAFE-OP	Display the current status value	
OP		Display current command value

If you want to check the current status of the product regardless of the communication status, please refer to the **MOTION TEST** window.

3.4.2 Mode of operation

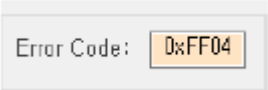


It displays the current product's operating mode - Mode of Operation (Object Index 0x6060) and Mode of Operation Display (Object Index 0x6061). The first number refers to the Mode of Operation (Object Index 0x6060), and the second number refers to the Mode of Operation Display (Object Index 0x6061). Mode of Operation (Object Index 0x6060) is an object transmitted from EtherCAT Master, and Mode of Operation Display (Object Index 0x6061) is an object that displays the current operation mode of the product.

The operation modes supported by STDF EC products are as follows.

Mode	Description
1	Profile Position Mode
6	Homing Mode
8	Cyclic Synchronous Position Mode

3.4.3 Error code



The current product's Error Code (Object Index 0x603F) value is displayed. Error Code (Object Index 0x603F) is an Object that displays the current status updated when the communication state (State Machine) is in SAFE-OP or OP state.

The types of error codes displayed are as follows.

Error Code	Alarm No.	Status	Description
0x7500	500	EtherCAT Communication Error	An error occurred in EtherCAT Communication.
0xFF01	1	Over Current Error	The current through power devices in inverter exceeds 4.8 A.
0xFF02	2	Over Speed Error	Motor speed exceed 3000 rpm.
0xFF03	3	Position Tracking Error	Position error value is higher than set value (Following error window (6065h).
0xFF04	4	Over Load Error	The motor is continuously operated more than 5 second under a load exceeding the Max. torque of motor.
0xFF05	5	Over Temperature Error	Inside temperature of drive exceeds 85 °C
0xFF06	6	Over Regenerated Voltage Error	Motor Back-EMF is higher than limit value.
0xFF07	7	Motor Connection Error	Abnormal connection between drive and motor.
0xFF08	8	Encoder Connection Error	Abnormal connection between drive and encoder.
0xFF0A	10	In-position Error	After operation is finished, position error (over 1) generated more than 3 seconds.

0xFF0C	12	ROM Error	Error occurs in parameter storage devices (ROM).
0xFF0F	15	Position Overflow Error	Position error value is higher than given value after completion of position movement command.
0xFF31	49	Drive Alarm	Generated Extra alarms generated from drive.
0xFF32	50	Internal communication error of drive	Communication error from internal components of drive generated (Time-out).
0xFF34	52	Internal communication error of drive	Communication error from internal components of drive generated (CRC Failed).
0xFF35	53	Internal communication error of drive	Communication error from internal components of drive generated (Command Failed).
0xFF3C	60	Torque enable Failure	Torque Enable command of drive failed.
0xFF3D	61	Push command Failure	Push command of drive failed.
0xFF41	65	Torque enable Failure	In-position signal is unstable or not detected during Torque Enable.
0xFF43	67	Homing Failure	In-position signal is unstable or not detected during the homing process.
0xFF46	70	Encoder Count Error	Encoder input signal is abnormal and normal measurement is impossible.
0xFF47	71	Network Initialization Error	An error occurred while initializing the hardware of EtherCAT communication.
0xFF4B	75	Abnormal Safety Input State	Abnormal connection of Safety Inputs.
0xFF64	100	ROM Initialization Error	ROM is blank status.
0xFF65	101	ROM Initialization Error	Checksum of ROM is not matched.
0xFF66	102	FRAM Access Error	Error generated during FRAM accessing.
0xFF6E	110	ROM Reading Error	Error generated during ROM reading.
0xFF79	121	ROM Reading Error	Error generated during ROM writing.
0xFF7A	122	ROM Reading Error	Error generated during ROM writing.
0xFFC8	200	ROM Data Out of Range Error	Some parameter values stored in ROM are out of range.

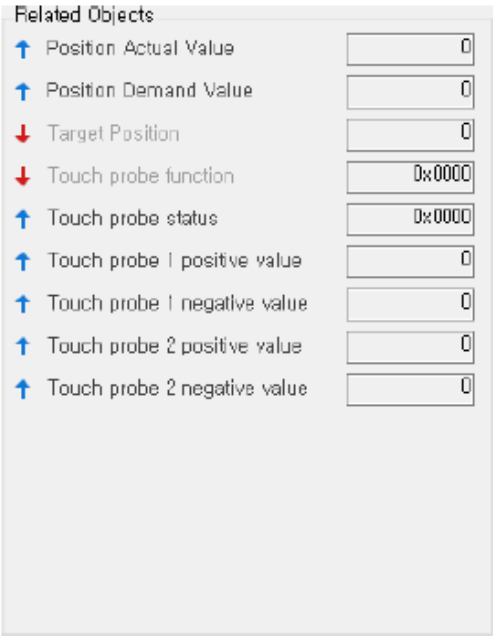
Error Code means the value of Error Code (Object Index 0x603F) displayed on the **EtherCAT STATUS MONITORING** window.

The Alarm No. refers to the value displayed on the **ALARM HISTORY** window and Alarm Type on the **MOTION TEST** window.

3.4.4 Related objects

It displays the current values of the objects used in the mode of operation display. You can confirm that it's a command or status object through the arrow icon in front of the object's name.

Icon	Description
↑	Object that displays the current status of the product.
↓	Object delivered from the EtherCAT Master

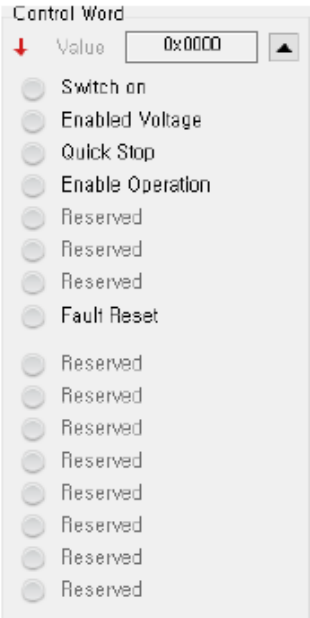


Some object values may not be updated depending on the communication state (State Machine). Objects that are not updated have their names displayed in gray.

It may be different from the list of objects displayed in Related Objects and the list of objects exchanged through PDO communication with the EtherCAT Master in real-time. You can check the list of objects exchanged through PDO communication in the EtherCAT PDO Mapping window.

3.4.5 Control word

Displays the value of Control Word (Object Index 0x6040) transmitted from EtherCAT Master. You can expand or shrink the window by clicking the arrow on the right. When the window is expanded, the circle on the left indicates the bit status, and the text on the right is the name of the bit.
Control Word is a command object transmitted by EtherCAT Master when the communication state (State Machine) is OP. If the communication state (State Machine) is not OP, the value is not updated and the Value text is displayed in gray.



The function of each bit of Control Word differs according to the current mode of operation (Mode of Operation Display). The list of common bits is as follows.

Bit	Description
0	Switch On
1	Enable Voltage
2	Quick Stop
3	Enable Operation
4 ~ 6	

7	Fault Reset
8 ~ 15	

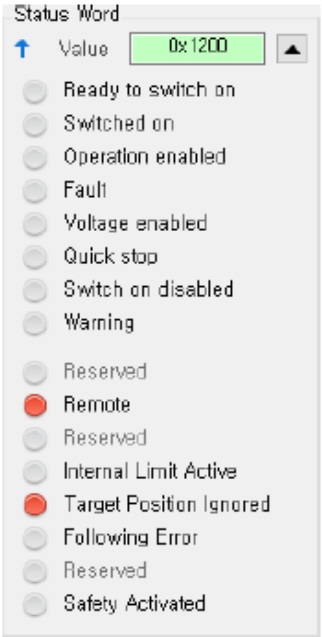
The types of commands according to the status of each bit of Control Word are as follows.

Bit 7	Bit 3	Bit 2	Bit 1	Bit 0	Command	Description
0	X	1	1	0	Shutdown	Servo OFF command status.
0	0	1	1	1	Switch on	
0	X	X	0	X	Disable Voltage	
0	0	1	1	1	Disable Operation	
0	X	0	1	X	Quick Stop	Quick Stop command was received
0	1	1	1	1	Enable Operation	Servo ON command was received
0 → 1	X	X	X	X	Fault Reset	Alarm Reset command was received

For details, refer to **4.1 DRIVE STATUS CONTROL** in the product STDF EC Manual.

3.4.6 Status word

Displays the value of Status Word (Object Index 0x6041) sent by the product. You can expand or shrink the window by clicking the arrow on the right. When the window is expanded, the circle on the left indicates the bit status, and the text on the right is the name of the bit.



Status Word is a status object transmitted from the product to the EtherCAT Master when the communication state (State Machine) is SAFE-OP or OP. Otherwise, the value is not updated and the Value text is displayed in gray.

The function of each bit of Status Word differs according to the current operation mode (Mode of Operation Display). The list of common bits is as follows.

Bit	Description
0	Ready to switch on
1	Switched on
2	Operation enabled
3	Fault
4	Voltage enabled
5	Quick stop
6	Switch on disabled
7 ~ 8	

9	Remote
10	
11	Internal Limit Active
12 ~ 15	

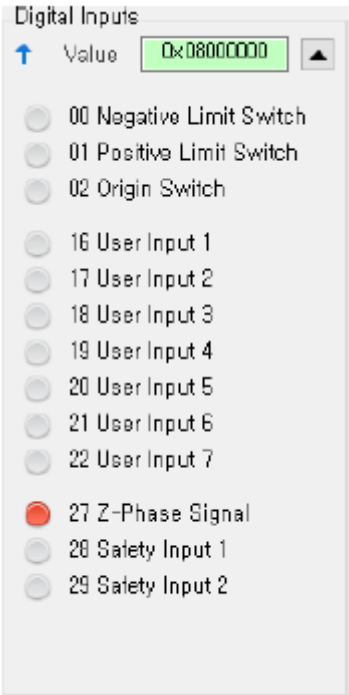
The types of drive status according to the status of each bit of Status Word are as follows.

Bit 6	Bit 5	Bit 3	Bit 2	Bit 1	Bit 0	Command	Description
0	X	0	0	0	0	Not ready to switch on	Servo OFF state
1	X	0	0	0	0	Switch on disabled	
0	1	0	0	0	1	Ready to switch on	
0	1	0	0	1	1	Switched on	
0	1	0	1	1	1	Operation enabled	Servo ON state.
0	0	0	1	1	1	Quick stop active	Quick Stop state
0	X	1	1	1	1	Fault reaction active	Alarm has been detected.
0	X	1	0	0	0	Fault	Alarm state.

For details, refer to **4.1 DRIVE STATUS CONTROL** in the product ETDF EC Manual.

3.4.7 Digital inputs

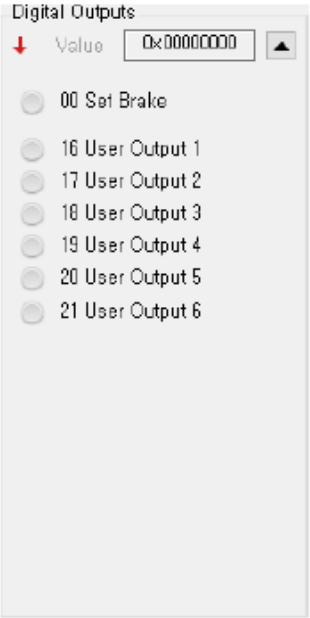
It displays the value of Digital Inputs (Object Index 0x60FD) that the product is sending. You can expand or shrink the window by clicking the arrow on the right. When the window is expanded, the circle on the left is the bit status, the number in the center is the bit number, and the text on the right is the name of the bit.



Digital Inputs are status objects transmitted from the product to the EtherCAT Master. When the communication state (State Machine) is SAFE-OP or OP, the current state is transmitted to the EtherCAT Master. Otherwise, the value is not updated and the Value text is displayed in gray.

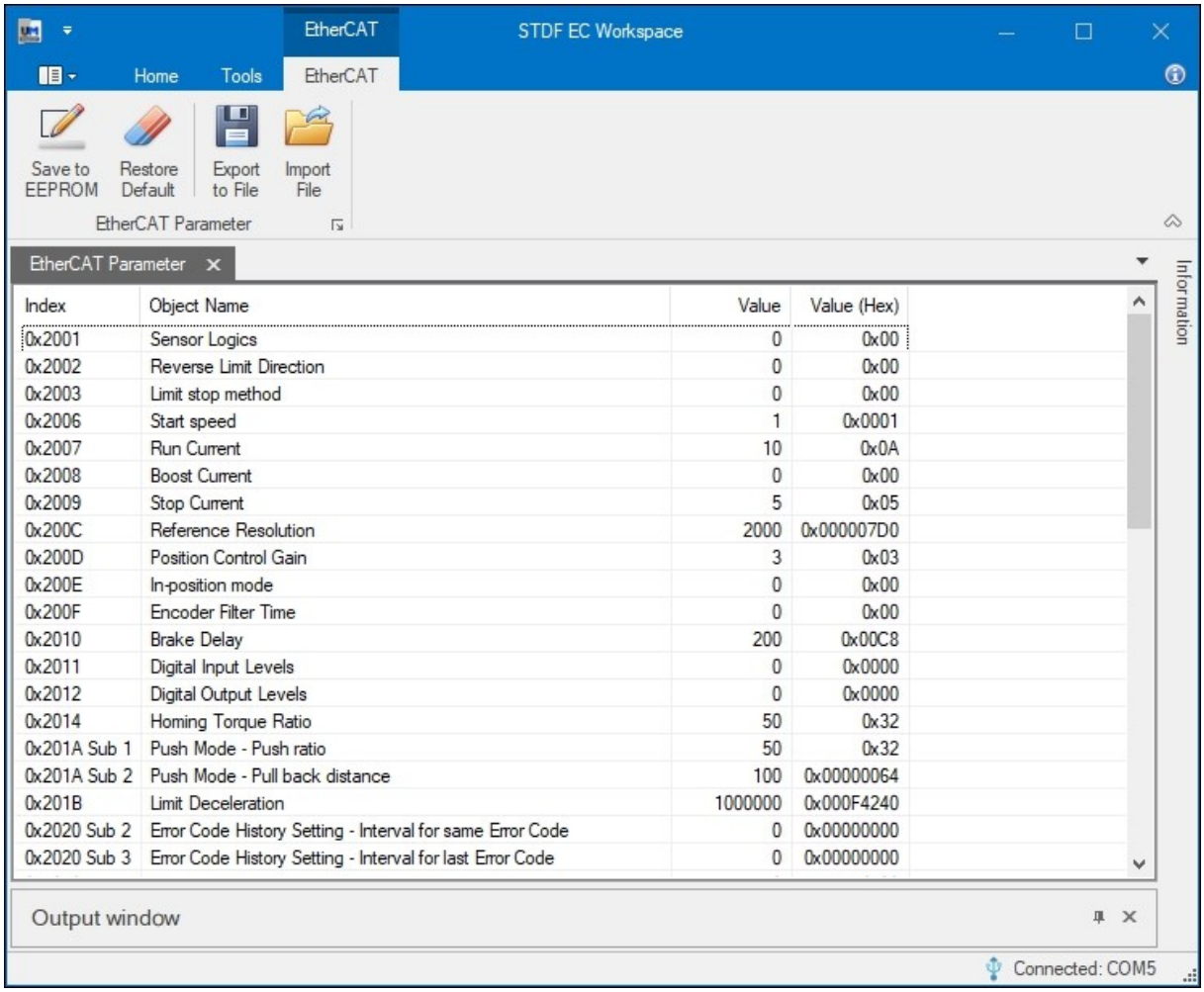
3.4.8 Digital outputs

It displays the value of Physical Outputs (Object Index 0x60FE, Sub-index 1) received by the product. You can expand or shrink the window by clicking the arrow on the right. When the window is expanded, the circle on the left is the bit status, the number in the center is the bit number, and the text on the right is the name of the bit.



Digital Outputs are command objects transmitted by EtherCAT Master when the communication state (State Machine) is OP. If the communication state (State Machine) is not OP, the value is not updated and the Value text is displayed in gray.

3.5 Ethercat parameter



Index	Object Name	Value	Value (Hex)
0x2001	Sensor Logics	0	0x00
0x2002	Reverse Limit Direction	0	0x00
0x2003	Limit stop method	0	0x00
0x2006	Start speed	1	0x0001
0x2007	Run Current	10	0x0A
0x2008	Boost Current	0	0x00
0x2009	Stop Current	5	0x05
0x200C	Reference Resolution	2000	0x000007D0
0x200D	Position Control Gain	3	0x03
0x200E	In-position mode	0	0x00
0x200F	Encoder Filter Time	0	0x00
0x2010	Brake Delay	200	0x00C8
0x2011	Digital Input Levels	0	0x0000
0x2012	Digital Output Levels	0	0x0000
0x2014	Homing Torque Ratio	50	0x32
0x201A Sub 1	Push Mode - Push ratio	50	0x32
0x201A Sub 2	Push Mode - Pull back distance	100	0x00000064
0x201B	Limit Deceleration	1000000	0x000F4240
0x2020 Sub 2	Error Code History Setting - Interval for same Error Code	0	0x00000000
0x2020 Sub 3	Error Code History Setting - Interval for last Error Code	0	0x00000000

You can check and set the product parameters on the **EtherCAT PARAMETER** window.

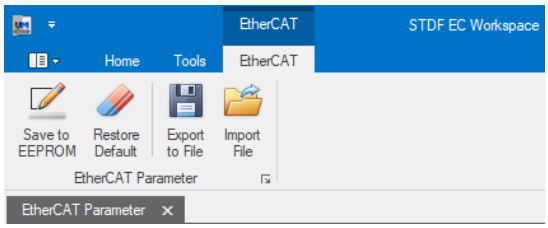
Parameter	Description
Index	The index of the object is displayed. If sub-index is not 0, sub-index value is also displayed.
Object Name	Displays the name of the object.
Value	Displays the value of the object in decimal.
Value (Hex)	Displays the value of the object in hexadecimal.

EtherCAT parameters take effect as soon as the value is modified. The values of EtherCAT parameters can be checked and modified at any time regardless of the EtherCAT communication state (State Machine).

The values of the modified parameters are restored to their previous values when the product is turned off. If you want to keep using the parameters with the changed values, click Save to EEPROM button to save the current values inside the product.

Click Restore Parameters to return all saved parameters to their factory default values.

3.5.1 Ethercat parameter menu

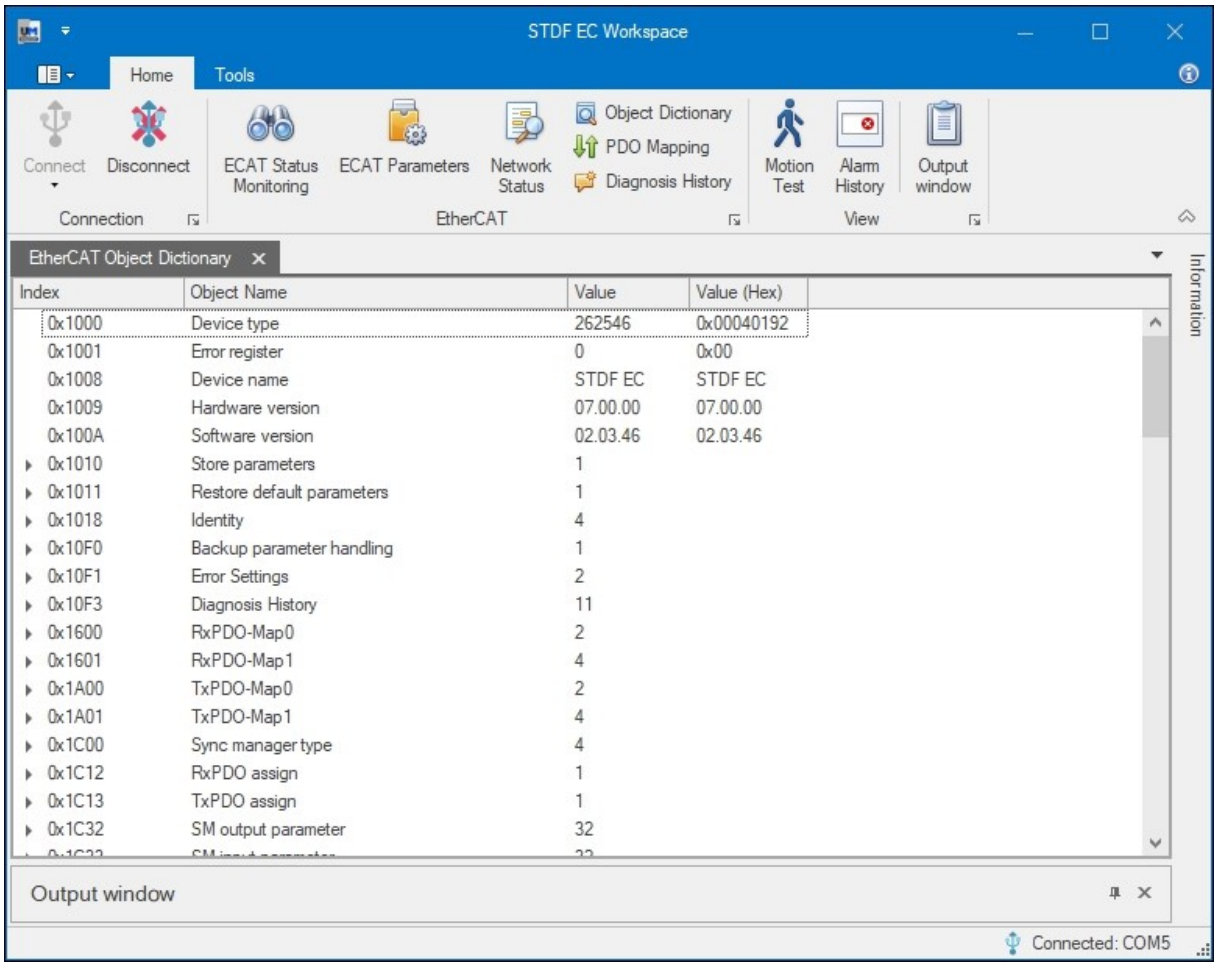


When the **EtherCAT PARAMETER** window is activated, the EtherCAT menu is added to the top menu of the program. The EtherCAT menu disappears when another window is activated.

Icon	Name	Description
	Save to EEPROM	The current parameters are saved in the product's EEPROM. When parameters are saved, the parameter values are retained even when the product is turned off.
	Restore Default	All product parameter values are initialized to factory default values. After clicking the Restore Default button, turn off the product to complete the parameter initialization process. After the parameter initialization command, if you click Save to EEPROM before turning off the product, the parameter initialization is canceled.
	Export to File	Export parameter values to a file.
	Import File	Read the parameter file. The parameters changed through the parameter file are not saved in the EEPROM.

		Please click Save to EEPROM button if you want to keep the parameter values.

3.6 EtherCAT object dictionary



Index	Object Name	Value	Value (Hex)
0x1000	Device type	262546	0x00040192
0x1001	Error register	0	0x00
0x1008	Device name	STDF EC	STDF EC
0x1009	Hardware version	07.00.00	07.00.00
0x100A	Software version	02.03.46	02.03.46
0x1010	Store parameters	1	
0x1011	Restore default parameters	1	
0x1018	Identity	4	
0x10F0	Backup parameter handling	1	
0x10F1	Error Settings	2	
0x10F3	Diagnosis History	11	
0x1600	RxPDO-Map0	2	
0x1601	RxPDO-Map1	4	
0x1A00	TxPDO-Map0	2	
0x1A01	TxPDO-Map1	4	
0x1C00	Sync manager type	4	
0x1C12	RxPDO assign	1	
0x1C13	TxPDO assign	1	
0x1C32	SM output parameter	32	

On the **EtherCAT OBJECT DICTIONARY** window, you can check the list of objects that the product has.

Parameter	Description
Index	The index of the object is displayed.
Object Name	Displays the name of the object.
Value	Displays the value of the object in decimal.
Value (Hex)	Displays the value of the object in hexadecimal.

The values displayed on the screen are not updated in real-time. You can update the values by clicking Refresh in the pop-up menu or pressing the F5 key.

3.7 EtherCAT PDF Mapping

On the **EtherCAT PDO MAPPING** window, you can check the PDO Mapping of the EtherCAT communication currently set in the product.

The values on the window are set through the EtherCAT Master and are set when the EtherCAT communication state (State Machine) is changed from PRE-OP to SAFE-OP. In other words, it is valid data only when the communication status is OP or SAFE-OP.

*EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

UNIMOTION

We cover all major markets. If you wish to contact us, send us an enquiry and we will be happy to assist you.

GERMANY

Unimotion GmbH
Waldstrasse 20
D - 78736 Epfendorf

T +49 (0) 7404 930 85 60
F +49 (0) 7404 930 85 61

www.unimotion.de
vertrieb@unimotion.de

NORTH AMERICA

Unimotion North America, Inc.
3952 Ben Hur Ave, Unit 5
Willoughby, OH 44094

T: +1 440-525-9106

www.unimotionusa.com
info@unimotionusa.com

Unimotion: May 2021