SD CONTROL UNIT FOR AC DRIVES LV

SECOM
Power Electronic Equipment & Components

About Us

FOUNDED IN 1975, SECOM IS A LEADING COMPANY FOR THE DISTRIBUTION AND PRODUCTION OF COMPONENTS AND DEVICES FOR POWER ELECTRONICS

SECOM continuously carries out new research and technical proposal in conjunction with important clients, providing technical support to meet their specific needs.

Production excellence and efficient organization allow SECOM to commit itself to providing to the market with timely and professional service in numerous sectors of static energy conversion.
Flexibility and short delivery time have become pillars to SECOM's company policy.

WHO WE ARE **>>**

Over the years the company has become an important designer and manufacturer of power electronic devices for industrial automation manufacturing technologies

WHAT WE DO **>>**

SECOM studies and manufactures customized solutions on behalf of its customers.

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CONTROL UNIT
OVERVIEW

SECOM provides a new universal control system for its inverters completely developed in house.

Focused on industrial application, **SD CONTROL** currently covers a wide range of control strategies for induction motors, regenerative frontend, grid application and much more.

The fiber optic connection between SD CONTROL and power part simplifies cabling even in the parallelization of converters.

The SD MANAGER configuration tool helps the customer to achieve a short commissioning time with a simple parametrization interface.

Main general data	
Main supply voltage	24V$_{CC}$
Consumption	300mA
Protection degree	IP20
Installation	Wall mounting
I/O	16 Input, 10 Output (6 relay 125 Vac - 4 Output collector)
Communication	Ethernet, CanOpen, Modbus TCP/IP, (Profibus DP slave or profinet as option)
Internal device	Real time PLC
Dimensions	165*45*230 (W*D*H)
Weight	0,5 kg
Control type	Grid control type and motor control type
Motor control system	V/Hz, Field oriented, Sensorless FOC
Grid control system	AFE, F3E, VAC

Ambient conditions	
Altitude	1000 m above sea level
Climate	Temperate
Operating temperature (min./max.)	0 ÷ 40°C
Storage temperature	-40 ÷ +70°C
Relative humidity	10 ÷ 90% (from 0 to 40°C)

CONTROL UNIT

FEATURES

The control unit permit to select the most suitable control method according to need of use.
The **SD-MCU** allows F3E, AFE, Inverter control strategies and much more.

1. Motor control highlights

		Encoder	Output voltage sensor	Ouput LC filter	DC voltage accuracy	V_{DC} response	Transient current response	1° harmonic current accuracy	Transient speed response	Speed accuracy
V/Hz	Scalar	Option	Option	Option	-	-	Slow	< 1%	Slow	1%
	Open loop	Option	Option	Option	High	Slow	Fast	< 1%	Fast	< 1%
	Closed loop	Option	Option	Option	High	Slow	Fast	< 1%	Fast	< 1%
Fiel oriented (FOC)		Option	Option	Option	High	Fast	Very fast	< 1%	Very fast	< 0,01%
Sensorless (FOC)		Option	Option	Option	High	Fast	Very fast	< 1%	Very fast	< 0.3%

2. Grid control highlights

	Output voltage sensor	Ouput LC filter	DC voltage accuracy	Transient DC voltage response	Transient current response	1° harmonic current accuracy	Active current control	Reactive current control	Grid parallel
AFE	Option	< 1%	Very fast	Very fast	Very fast	< 1%	Yes	Yes	Yes
F3E	Option	-	Very fast	Very fast	-	-	-	No	Yes
VAC	Option	-	-	-	Very fast	< 1%	-	-	No

CONTROL UNIT
FUNCTIONS

The **SD-MCU** unit come with built in control function that the user can select according to the application need.

Control functions	
Flying restart	To estimate the motor speed before start with demagnetized motor
Fast flying restart	To estimate the motor speed before start in any condition (it requires SD-SYNC)
2 digital potentiometer	To generate a reference with configurable steps
2 JOG	A pulse to reach a certain speed reference with a certain ramp time
Cold Bypass (starter)	To start the motor up to the grid voltage and frequency and afterwards the motor will be connected to the grid and the Inverter will be bypassed
Hot Bypass	Bring the motor on line to the grid and vice-versa
Helper (Master-follower)	A master drive can control other slave drive with a reference of torque (for motor control) or current (for AFE)
Ride through (kinetic regeneration)	If the DC voltage goes down, the DC bus vale is substained by keeping the kinetic energy of motor and load
Grid waiting	If the DC goes down, power module switch off the pulses till the DC voltage be back
Current Brake and/or V_{DC} rollback	To speed up the actual ramp stop time
Energy saver	To reduce as much as possible the power loss
Safe torque off	SIL 3 - safety function to avoid torque transfer
Speed droop	To share the load when more motors are mechanically coupled

Other control feature	
Commissioning/ID test	A useful set of function to detect the motor parameter from plate data, or at standstill or in run for magnetization curve detection
Short circuit Management	For VAC generator, it is possible to control the short circuit current for protection selectivity with various strategy
Regulators auto-tuning	Main regulator coefficients are autodetected
Configurable I/O	Almost all the digital I/Os are configurable; for example an output can be connected to a bit of a command or status word
Various mechanical reference	Up to 4 ramps time with various way to select them, 4 skip frequency, torque reference, up to 2 reference source, etc
Alarms configuration	All the software alarm are configurable. The drive can perform even an OFF1/2/3 before switch to fault state
Internal custom PLC	Users can program a custom PLC to add functionalities, expand I/O, etc

CONTROL UNIT
SIGNAL INTERFACE

SD-MCU Control card manages analog and digital signals coming from system and general alarms.

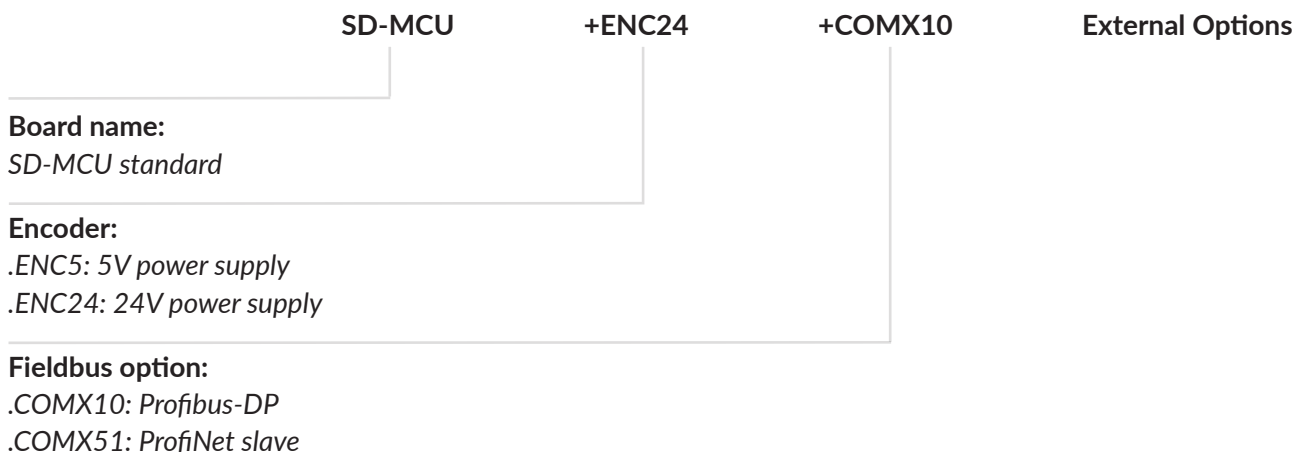| Digital output signals - X3		
X3-1	OUT1	Digital output signal 1
X3-2	GND	0V reference for signals
X3-3	OUT2	Digital output signal 2
X3-4	GND	0V reference for signals
X3-5	OUT3	Digital output signal 3
X3-6	GND	0V reference for signals
X3-7	OUT4	Digital output signal 4
X3-8	GND	0V reference for signals
Digital output realys - JP2		
JP2-1,2,3	NO, C, NC	Output relay 1 (MCB close CMD)
JP2-4,5,6	NO, C, NC	Output relay 2 (Precharge close CMD)
JP2-7,8,9	NO, C, NC	Output relay 3
JP2-10,11,12	NO, C, NC	Output relay 4
JP2-13,14,15	NO, C, NC	Output relay 5 (Inverter fan start CMD)
JP2-16,17,18	NO, C, NC	Output relay 6 (Fault active)

Analog signals JP3	
JP3-2	0V analog inputs
JP3-3	Analog input (4-20mA/±5V)
JP3-6	0V analog inputs
JP3-7	Analog input 2 (4-20mA/±5V)
JP3-10	0V analog inputs
JP3-11	Analog input 3 (4-20mA/±5V)
JP3-14	0V analog inputs
JP3-15	Analog input (±10V)
JP3-18	0V analog inputs
JP3-19	Analog input 5 (±10V)
JP3-22	0V analog inputs
JP3-23	Analog input 6 (±10V)

Digital input signals 24V X1		
X1-1	Digital IN 1	Input for the digital input 1
X1-2	Digital IN 2	Input for the digital input 2
X1-3	Digital IN 3	Input for the digital input 3
X1-4	Digital IN 4	Input for the digital input 4
X1-5	Digital IN 5	Input for the digital input 5
X1-6	Digital IN 6	Input for the digital input 6
X1-7	Digital IN 7	Input for the digital input 7
X1-8	Digital IN 8	Input for the digital input 8
X1-9	GND	0V reference for signals
X1-10	Digital IN 9	Input for the digital input 9
X1-11	Digital IN 10	Input for the digital input 10
X1-12	Digital IN 11	Input for the digital input 11
X1-13	Digital IN 12	Input for the digital input 12
X1-14	Digital IN 13	Input for the digital input 13
X1-15	Digital IN 14	Input for the digital input 14
X1-16	Digital IN 15	Input for the digital input 15
X1-17	Digital IN 16	Input for the digital input 16
X1-18	GND	0V reference for signals

CONTROL UNIT
CODING

The control unit SD-MCU is identified by a unique code described as follow:

SD-MCU   +ENC24   +COMX10   External Options

Board name:
SD-MCU standard

Encoder:
.ENC5: 5V power supply
.ENC24: 24V power supply

Fieldbus option:
.COMX10: Profibus-DP
.COMX51: ProfiNet slave

Option code	Description
/OP	Operator Panel with USB cable (3m) and Ferrite
/SYNC	Temperate

Fieldbus communication interface
A redundant power supply can be added internally to each power module.
The power supply card (ALIDAN) is a powerful switching power supply for back up purpose of the +24V$_{DC}$ voltage used in all the electronic cards present is SD drives.

Fieldbus name	Equipment	Example use
CAN Open Master	Standard	Remote I/O expansion Master/Follower application (Master side)
CAN Open Slave	Standard	Automation level 1 slave
Modbus TCP Master	Standard	Remote I/O expansion
Modbus TCP Slave	Standard	Automation level 1 slave SDM interface
Profibus Slave	Optional	Level 1 Slave

SAFETY
INTEGRATED

The SECOM drive have integrated safety functions that prevent the requirement of many external electromechanical components that should be normally used to ensure the safety standards.

Safe Torque Off (STO)
"Safe Torque Off" ensures that torque is no longer output at the motor shaft.

Certificate Number	20161227_4787333343-
Report Reference	20161227_4787333343_Functional Safety Report
Issue Date	2016-December-27th

Additional Information: Safety function «Safe Torque Off (STO)» as defined by IEC 61800-5-2, complies with the requirements for the following functional safety ratings:

- SIL Capability 3, as defined by IEC 61800-5-2:2007
- SIL 3, as defined by IEC 61508:2010
- PL e, Category 3 as defined by ISO 13849-1:2006
- SIL Claim Limit 3 as defined by IEC 62061

Further safety-related data :

- PFH (as defined in IEC 61508:2010): 3.372E-08/h
- MTTFd (as defined in ISO 13849-1:2006): 3385 years

The product must be installed, operated, and maintained, in accordance with the instructions for use.

CONTROL UNIT
AND OPTIONS

1. SD-MCU

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2. COMX - Profibus - DP Interface SD-COMX10

The SD-COMX10 communication module has been designed to be integrated into directly to the motor controllerSD-MCU to add a network profibus interface. All communication tasks are executed autonomously within the module - irrespective of the processor of the target device.

Process data is exchanged via a Dual-Port-Memory which is accessed either by an 8-/16 bit bus interface or a fast 50 Mhz SPI interface.

3. COMX - Profinet Interface SD-COMX51

The SD-COMX51 communication module has been designed to be integrated into directly to the motor controller SD-MCU to adda network Profinet interface. All communication tasks are executed autonomously within the module - irrespective of the processor of the target device.

Process data is exchanged via a Dual-Port Memory which is accessed either by an 8-/16-bit bus interface or a fast 50 Mhz SPI interface.

CONTROL UNIT
AND OPTIONS

4. ENC-Encoder card SD-ENC

The Encoder Receiver Option allows incremental encoders to be connected directly to the motor controller SD-MCU to provide highly accurate speed feedback measurement. It mounts directly to the Main Control Board.
It's used for Flux Vector Control operation with sensor it therefore improves drive performance of the motor control.

5. SYNC - Synchronization card SD-SYNC

The synchronization card is used in all the application where a line synchronization is required. Then SD-SYNC card is present in all the AFE/F3E configuration and can be placed inside the power stack or alternatively directly on the main line. As standard the card is supplied with aluminum case IP20.

6. OP-Keypad SD-OP

The Keypad is a simple and fast way to program and communicate with the drive, a power platform with a menu structure permit a rapid interpretation of parameters and functions.

7. Cable

Keypad cables to connect the control unit SD-MCU to the keypad.

SECOM DRIVE
MANAGER

SDM (SECOM Drive Manager) permit to configure the drive by RJ45 port (Ethernet cable).
The main features are:

- Set parameters configuration and password to lock modification
- Save up to 3 parameters default configuration
- Keep the control (manual control) completely bypassing the reference configuration
- Commissioning the drive quickly and autotune some regulators
- Grouping the parameters in recipes to customize (and simplify) the use of the drive manager
- Compare parameters with other drives
- Check and configure the active faults and alarms and action to perform
- Check the parameter log with the time table
- Check the alarm history log with time table and configure the alarms behavior
- Download and upgrade the control software (via USB key too)
- Download the Data Log (trace) and see what happened before and a little after a fault
- Download a custom PLC Application (or a PLC provided by SECOM or other partners)
- Monitoring the actual quantity of the drive an plot it with realtime or non-realtime graph
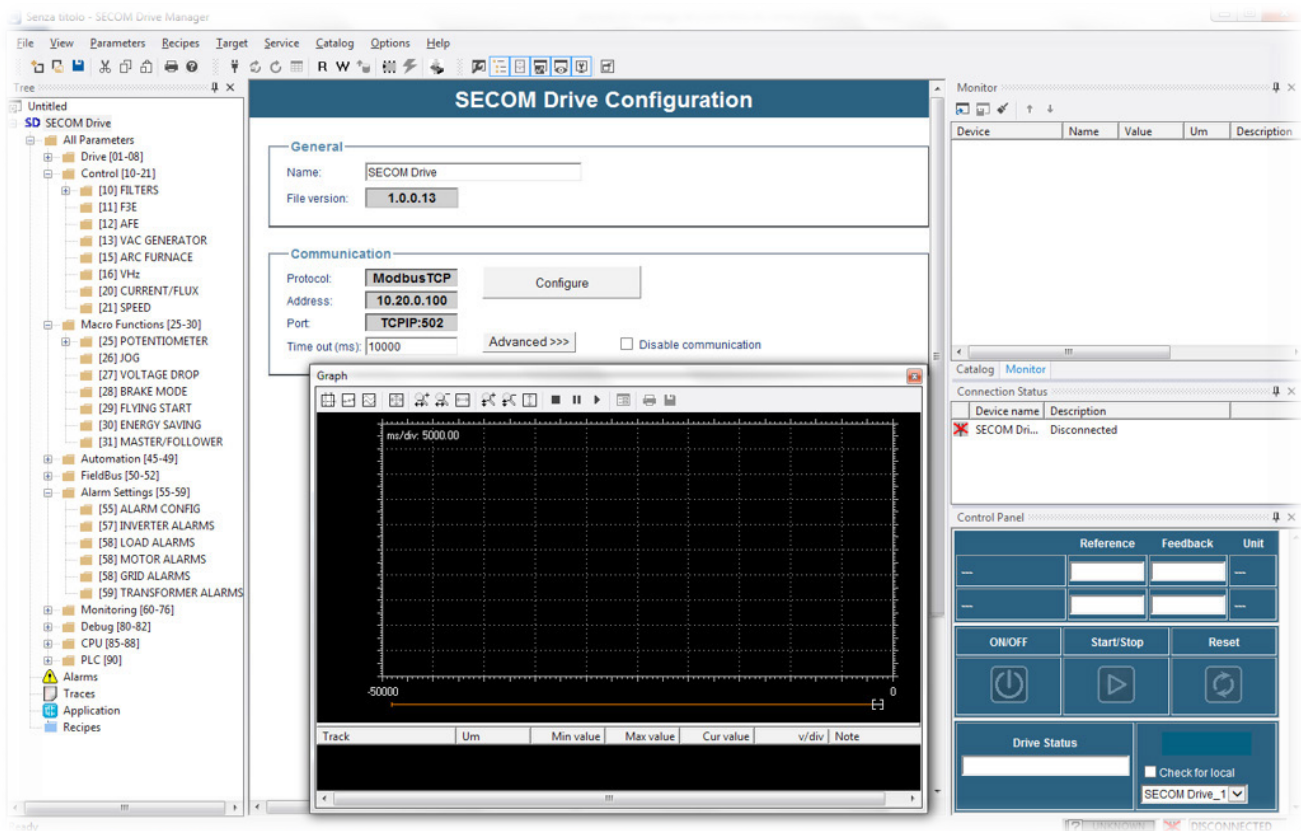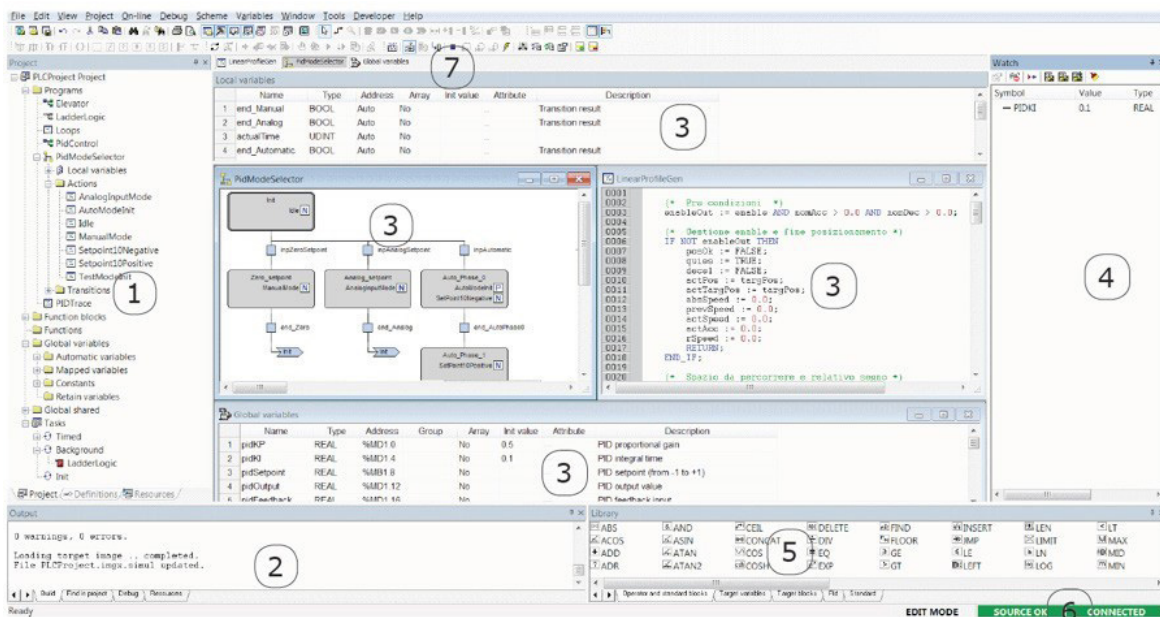
SECOM DRIVE
MANAGER

The **SOFT SCOPE TOOL** provided with SECOM drive manager allows viewing, saving and opening control analog signal with cycle time synchronous with control frequency (real time).
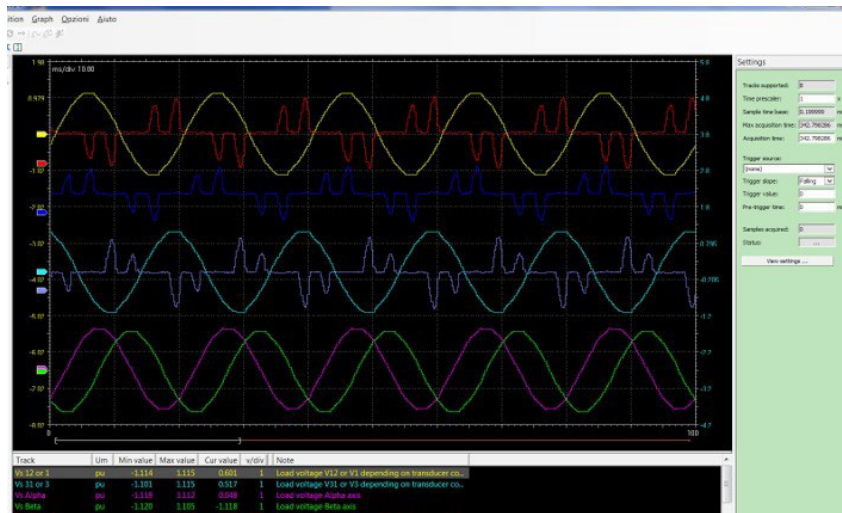
SD logic environment (PLC) permit to program a logic function inside the control unit SD-MCU. The software support the standard programming languages (IL, ST, LD, FDB, SFC).
PLC function can be used for:

- Command fans, contractors, relays
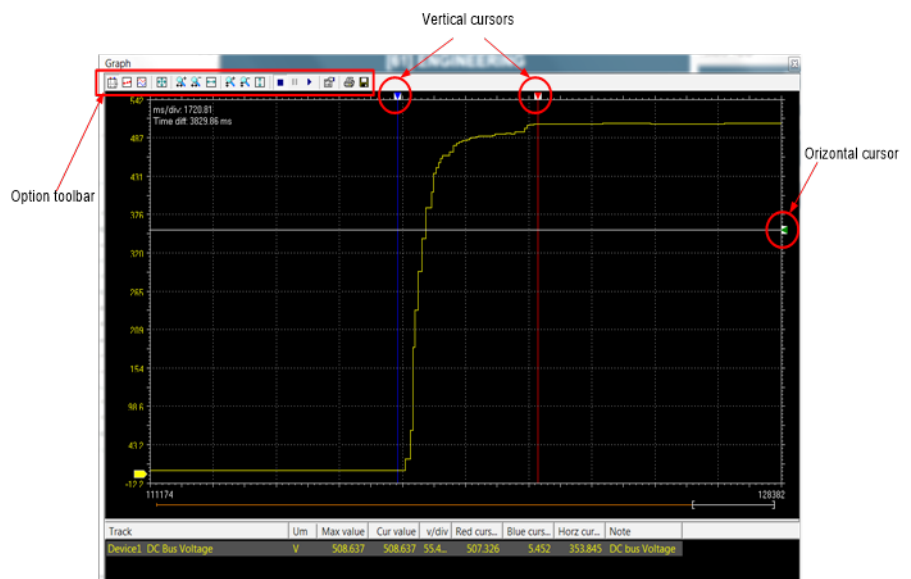- Create new functions, signal interface and alarms

SECOM DRIVE
MANAGER

Further SECOM Drive Manager **features**:

- Parameter change history log
- Fault/warning history log
- Firmware download
- Control parameter lock code feature
- Different parameters set load/save
- Trace on event
- Upload/download via USB or Ethernet
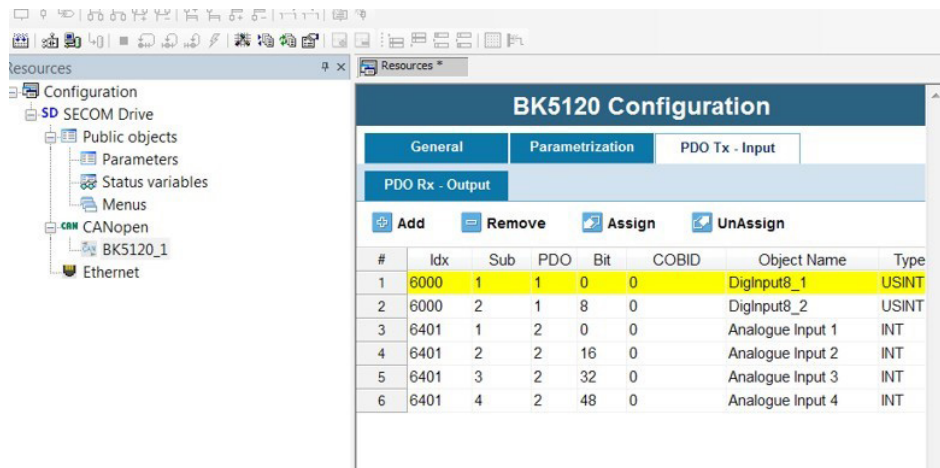
SD commissioning:

- Parameter calculation
- Motor identification at stand still (under development)
- Magnetization curve detection
- Trouble shooting tool analysis