



OPDE & MiniOPDE





OPDE



Mini OPDE

INNOVATIVE TECHNOLOGY

OPDE is extremely **flexible** with **6 modes** of operation: Inverter, Brushless STD and Sensorless, Active Front End, Chopper, Starter, Reluctance.

- ▶ New generation 32 bit floating point DSP (Texas TMSF28335, 150Mips)
- ▶ PLC on board programmable according to IEC 61131-3
- ▶ OPD EXPLORER configuration tool for drive programming
- ▶ Safe Torque Off (STO) and TUV certificated

MiniOPDE

Servo Drive Inverter
Field Oriented Control
230 – 400Vac



From 0,4kW up to 3kW

230 V				
Power (kW) 230VAC	0,4	1,1	2,2	3
I nom. Arms	2,4	5,9	8,8	10,5
Overload	120% x 30 S – 150% x 30 S – 200% x 30 S			
Dimensions (mm)	H= 224 x L= 74 x P= 176			
400V				
Power (kW) 400VAC	0,8	1,5	3	
I nom. Arms	2,4	4	7,1	
Overload	120% x 30 S – 150% x 30 S – 200% x 30 S			
Dimensions (mm)	H= 224 x L= 74 x P= 176			



Digital & Analog I /Os

Digital Input opto	n° 8
Digital Output opto	n° 2
Analog input	n° 2
Analog input differenziale	n° 1
Analog Output	n° 2
Reference voltage	+10V / 0V / -10V
Relay output:	n° 1 5 A - 250 Vac o 5 A - 30 VDC
Feedback	Resolver, Encoder hall sensor, TTL Incremental Encoder – SinCos absolute, Endat 2.1-2.2, Biss
Simulated Encoder Output	Su DB9
Frequency Input	Su DB9
Motor thermal switch	PTC e ON/OFF
Fan on heat sink	Controlled by software to reduce noise and increase the fan life



MiniOPDE

- 8 digital inputs
- 2 digital outputs
- 3 analog inputs $\pm 10V$
- 2 analog outputs $\pm 10V$
- 1 stabilized supply $\pm 10V$
- 1 relay output
- 1 integrated CANopen line

- TTL Encoder
- TTL Encoder and Hall sensors
- Resolver
- Sin-Cos encoder (incremental and absolute)
- Endat 2.1 and 2.2 encoder
- Biss encoder
- Resolver + High resolution analog inputs

AC input power:
1 Phase / 3 phase $110 \div 230V_{AC}$
3 phase $230 \div 460V_{AC}$

Memory Key Connector

Keypad and Display

Simulated Encoder Output

CAN bus line
Frequency Input

Relais Output
RS 485 Modbus for PC
Programming
and Device Interfacing

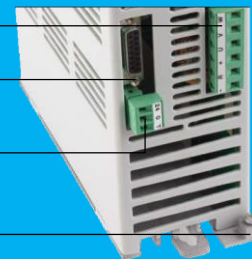
I/O analog / digital

U V W motor power connection
R R for external braking resistor
DC bus input ($280 \div 750V_{AC}$)

Feedback Options

24 V electronic supply
And motor temperature sensor

Shield cable management



OPDE Series

Universal Control
for Electric Motors
400Vac



From 1,5kW up to 30kW



Size	S		M			L	X		
Power KW 400VAC	1,5	3	5,5	7,5	11	15	20	22	30
Rated Current (A _{rms})	3	7	12	15	22	32	40	48	60
Overload	120% x 30 sec – 150% x 30 sec – 200% x 3 sec – 200% x 30 sec								
STO Function	SIL Capability 2 Performance Level D Category 3								
Sizes (mm)	H= 303 x L=89 x P=253		H= 303 x L=116 x P=253			H= 322 x L=137 x P=253		H= 322 x L=194 x P=273	

From 37kW up to 250kW

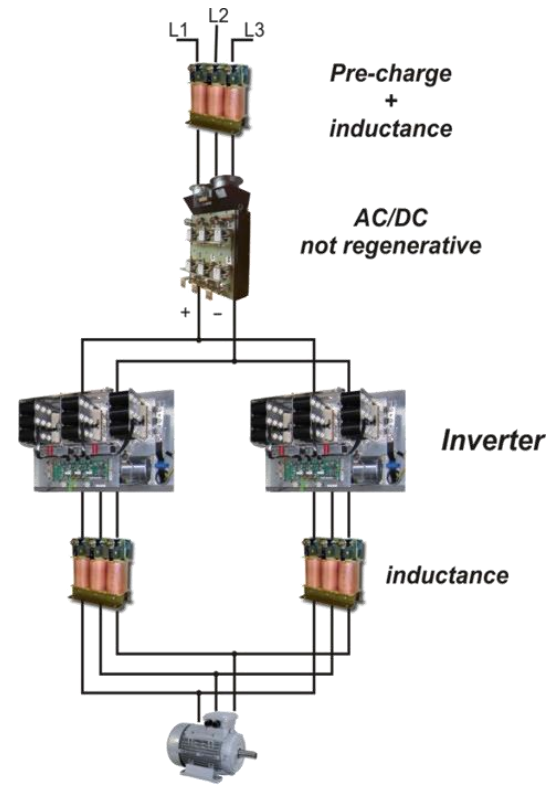
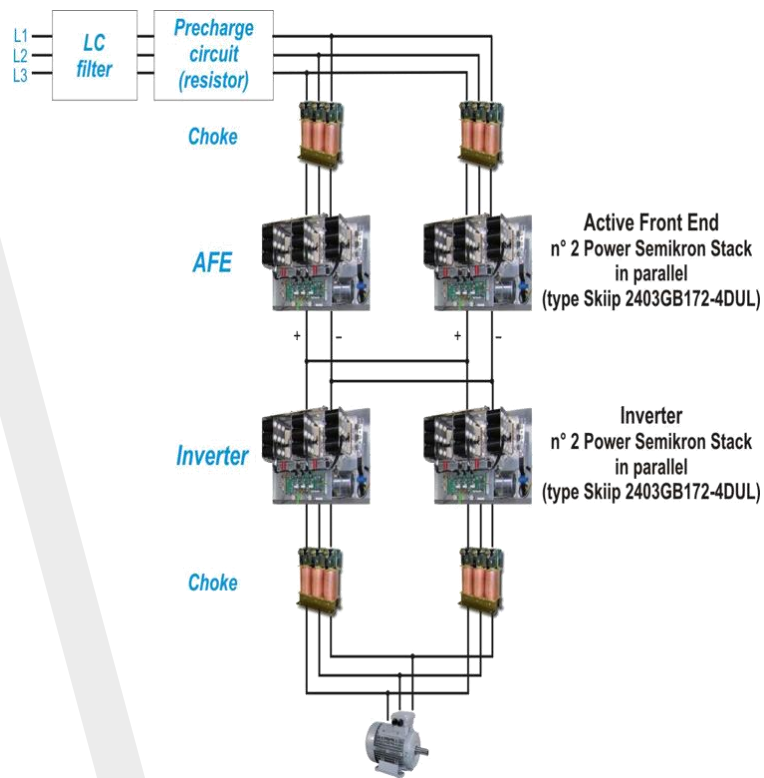


Size	1				2			3		
Power KW 400V _{AC}	30	37	45	55	75	90	110	132	160	200
Rated Current (A _{rms})	70	90	110	150	175	220	250	310	370	460
Overload	120% x 30 sec – 150% x 30 sec – 200% x 3 sec – 200% x 30 sec									
STO Function	SIL Capability 2 Performance Level D Category 3				SIL Capability 3 PL e Category 3					
Sizes (mm)	H= 675 x L=251 x P=290				H= 900 x L=478 x P=296			H= 900 x L=678 x P=296		

From
315kW
Up to 2MW



From
315kW
Up to 2MW



OPDE Connections



AC Input: $3 \times 200 \div 460 \text{V}_{AC}$ / DC Input: $280 \div 750 \text{V}_{DC}$
 Anybus port
 Safe Torque Off (STO) (option)
 Regulation Power Supply 24 V_{DC}

Keypad & Display

Connector for the remotable keypad

RS 485 Modbus for PC programming and device
 interfacing
 Frequency Input

USB Key connector

I/O ANALOG / DIGITAL

I/O ANALOG / DIGITAL

CANbus
 Profibus
 EtherCAT

1° Feedback Sensor
 2° Feedback Sensor
 CANbus Port

- 8 configurable digital inputs
- 2 configurable digital outputs
- 2 relay output
- 3 configurable analog inputs
($\pm 10\text{V}$)
- 2 configurable analog outputs
($\pm 10\text{V}$)
- 1 frequency input
(f max 400kHz)
- 1 reference voltage supply
($\pm 10\text{V}$)



Simulated encoder output and motor
 thermal probes (PTC, NTC, KTY84)

U V W motor power connection
 + and F for external braking resistor

OPDE

Digital and Analog I/O



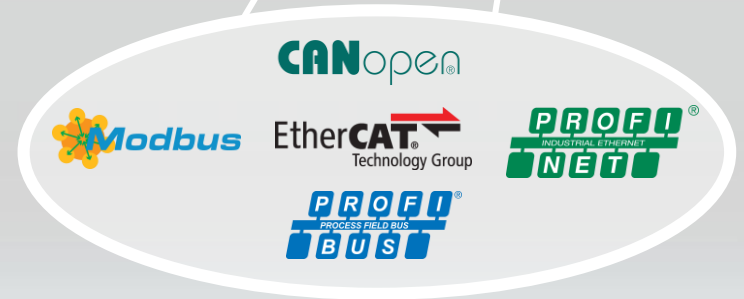
- 4 configurable digital input
- 2 configurable digital output
- 1 relay output
- 2 configurable analog inputs ($\pm 10V$)
- 1 configurable analog outputs ($\pm 10V$)
- Power Supply $\pm 10V$
- 1 frequency input (f max 400kHz)
- 4 configurable digital input

- 2 configurable digital input
- 1 relay output
- 1 configurable analog inputs ($\pm 10V$)
- 1 configurable analog outputs ($\pm 10V$)

FieldBus

Management of 2 lines: in /out on the same Can Bus line, or 2 independent lines for the communication between the drive and outside, with interchangeable bus.

- ▶ Can Open DS 301 – DS 402.
Possibility to extend the I/O via Can Bus
- ▶ ProfiBUS DP – V1
- ▶ EtherCAT
- ▶ ProfiNET
- ▶ Other fieldbus with Anybus CC module (DeviceNet, Ethernet/IP, etc.)



Feedback SENSORS

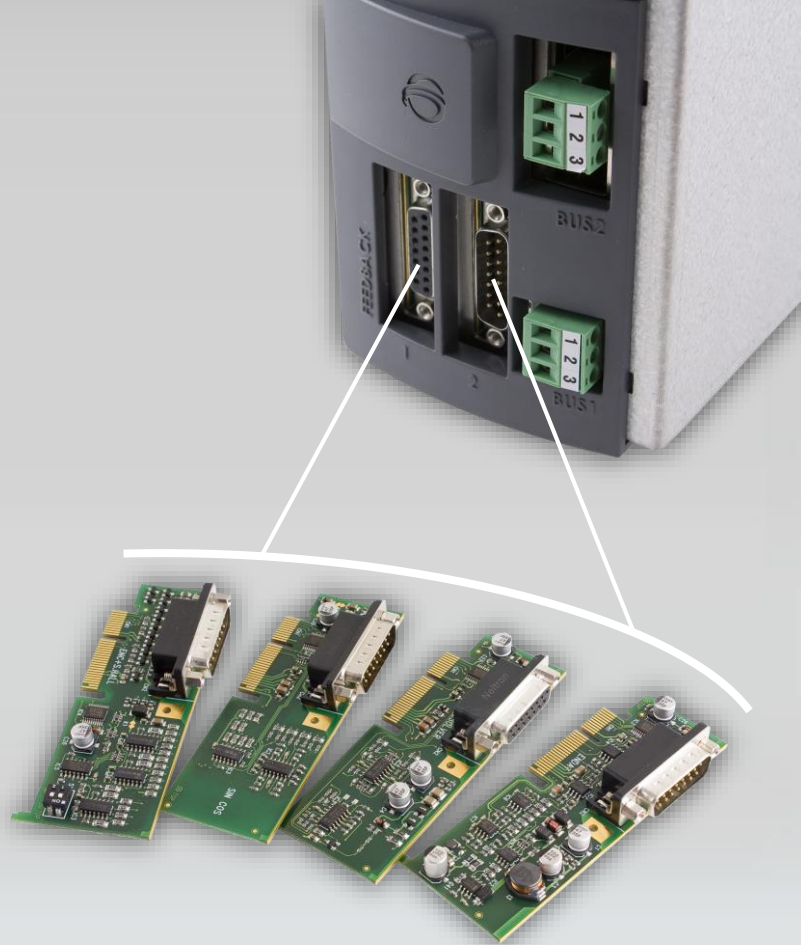
2 Feedback Sensors

The drive manages 2 feedback sensors
(one on the motor and one external)
Maximum input frequency 400 kHz

- ▶ Resolver
- ▶ Encoder TTL line driver and Hall sensors
- ▶ Encoder TTL line driver and Hall sensors
- ▶ Incremental and absolute sin / cos Encoder
- ▶ Encoder Endat 2.1 e 2.2
- ▶ Encoder Biss
- ▶ High Resolution Resolver
- ▶ Hiperface

Simulated Encoder Output

- ▶ Frequency input = frequency output
- ▶ Simulated encoder output (freq. out) = Referred to 1st sensor
- ▶ Simulated encoder output (freq. out) = Referred to 2nd sensor



Advanced FEATURES

Technical Data

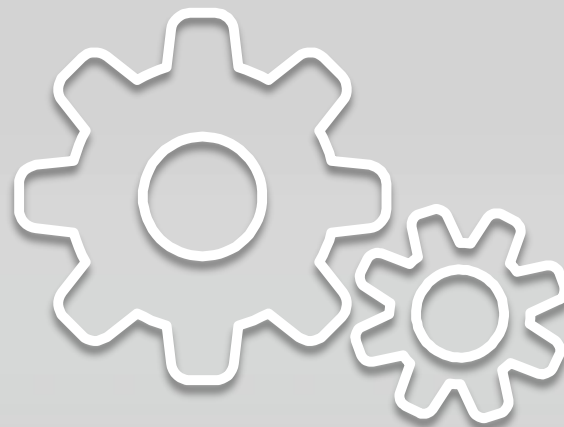
Output frequency:	0 - 1.500 Hz
Switching frequency:	(PWM)3 – 16 kHz
Speed loop bandwidth:	150 Hz (delay 45°)
Current loop bandwidth:	up to 1500 Hz (delay 45°)

Update Cycle **Internal Loop**

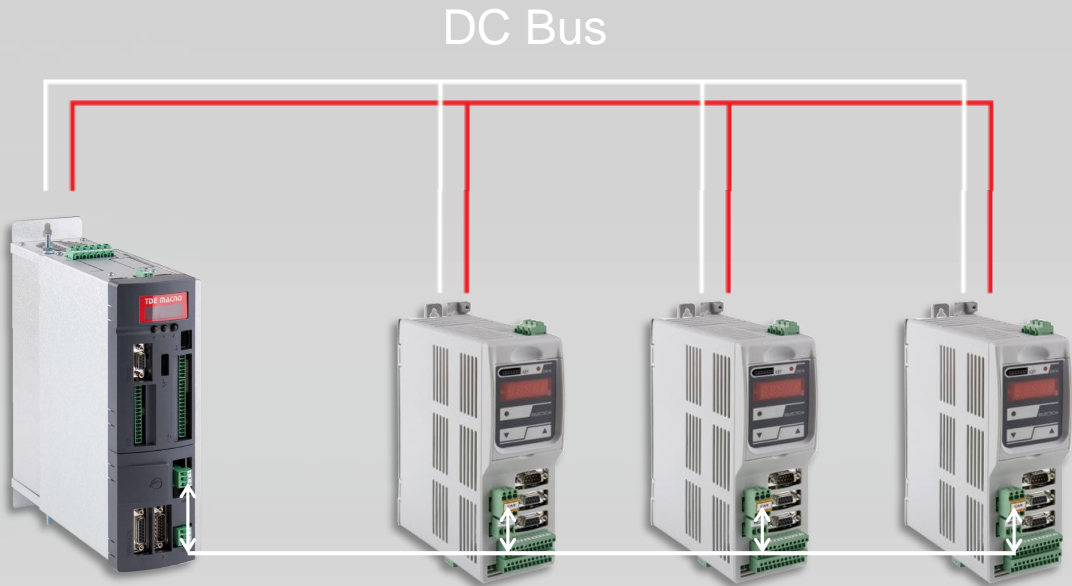
Speed loop	} equal to the PWM cycle selectable from 3 to 16 kHz
Current loop	
Positioning loop	
Speed task PLC	

PWM Cycle

PWM 5 kHz	200 microsec
PWM 10 kHz	100 microsec
PWM 12 kHz	83 microsec
PWM 16 kHz	62,5 microsec



OPDE DC Bus



OPDE

Universal Control for Electric Motors

OPDE V	INVERTER	Field Oriented Control – Vector V/F
OPDE B	BRUSHLESS	With feedback and weakening
OPDE B	BRUSHLESS	Sensorless
OPDE A	ACTIVE FRONT END	Sinusoidal regeneration unit
OPDE S	AFE ENERGY	for solar, wind, turbines
OPDE C	CHOPPER	for DC motors
OPDE M	STARTER	For motors and generators start-up and line synchronization
OPDE F	FUNDAMENTAL FRONT END	For Regeneration Unit with no PWM Modulation



OPDE V

Inverter

Frequency Converters for standard and Special Asynchronous Motors

- ▶ Boost for the start-up of the motor (2 times rated Torque)
- ▶ Good torque control up to 0,5 Hz
- ▶ Excellent control stability in weakening area (4 - 5 times the rated speed)
- ▶ Slip compensation
- ▶ Selectable frequency jump
- ▶ Motor Autotuning
- ▶ Overmodulation function (output voltage up to +10% compared to the input)
- ▶ Motor flying restart
- ▶ Energy Saving function for fans
- ▶ Special function for pumps management
- ▶ Speed sensor parameters check



OPDE V

Inverter

Frequency **Converters** for standard and Special **Asynchronous Motors**

- ▶ Motor electrical characteristics self-acquisition (resistor, leakage inductance, exciting current, stator and rotor time constant).
- ▶ Autotuning of current and flux loop
- ▶ Speed loop gains variation according to the motor speed
- ▶ Two parameters memory banks (for the management of two different motors)
- ▶ Management of micro power failure
- ▶ Excellent dynamic performances
- ▶ Starter function for the start-up and line synchronization of the motors



OPDE B

Inverter

Frequency Converter for Brushless Motors and Generators

- ▶ Control for standard brushless motors
- ▶ Control for Torque, Linear motors and Generators up to 160 poles
- ▶ Management of incremental feedback (auto-phasing at each turn-on of the drive)

Special Functions

- ▶ Motor control in weakening area
- ▶ Control of sensorless motors and generators using the motor BEMF
- ▶ Sensorless control of the motor from 0 rpm with good performances



OPDE A

Active Front End

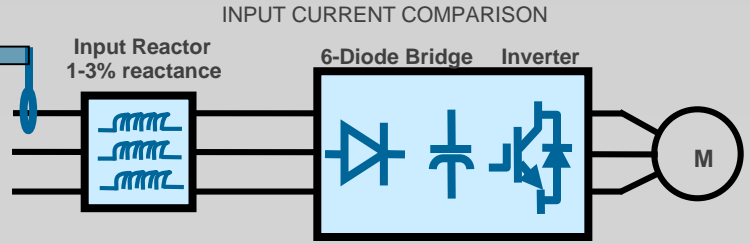
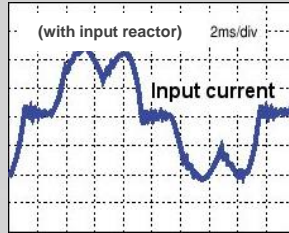
Low harmonic content Regenerative Unit

- ▶ Low harmonic content regenerative unit with unity $\cos \theta$ and sinusoidal wave
- ▶ Line voltage change ment compensation
- ▶ Energy saving
- ▶ Bus control even with main voltage fluctuations
- ▶ Power unit bidirectional flow
- ▶ Adjustable power factor
- ▶ THD lower than 3%

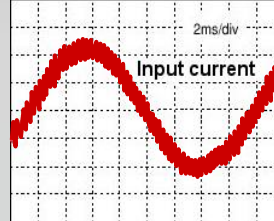


OPDE A AFE System

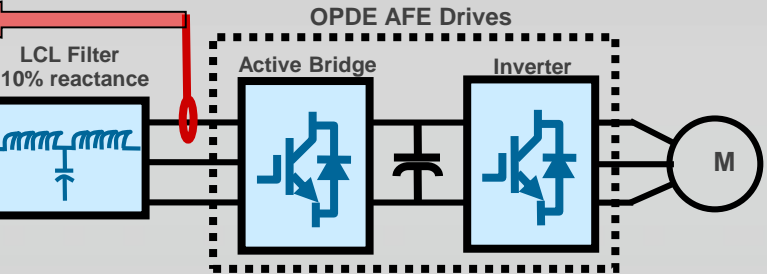
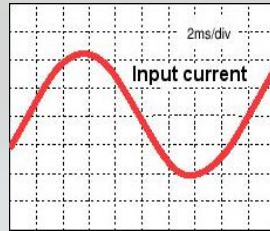
Conventional diode rectifier AC Drive



AFE drive without LCL filter



AFE drive with LCL filter



AFE with LCL filter produces no current harmonics!

OPDE M

Starter

Frequency converter for asynchronous motors and generators

Converter for the start-up and line synchronization of asynchronous motors and generators



OPDE F

Fundamental Front End

Regenerative Unit

- ▶ Energy saving
- ▶ There is no heat to dissipate in Braking Resistors
- ▶ Bidirectional power exchange between AC mains and DC Bus

Compared to the AFE solution:

- ▶ Increase in current size
- ▶ The main reactance is smaller
- ▶ There is no need of LC filter with a saving in terms of cost and space.



Utility SOFTWARE

Configuration, Supervision and
Programming Tool

- ▶ **OPD EXPLORER** configurator
- ▶ Integrated PLC with development environment **LOGIC LAB**
(Standard IEC 61131-3)

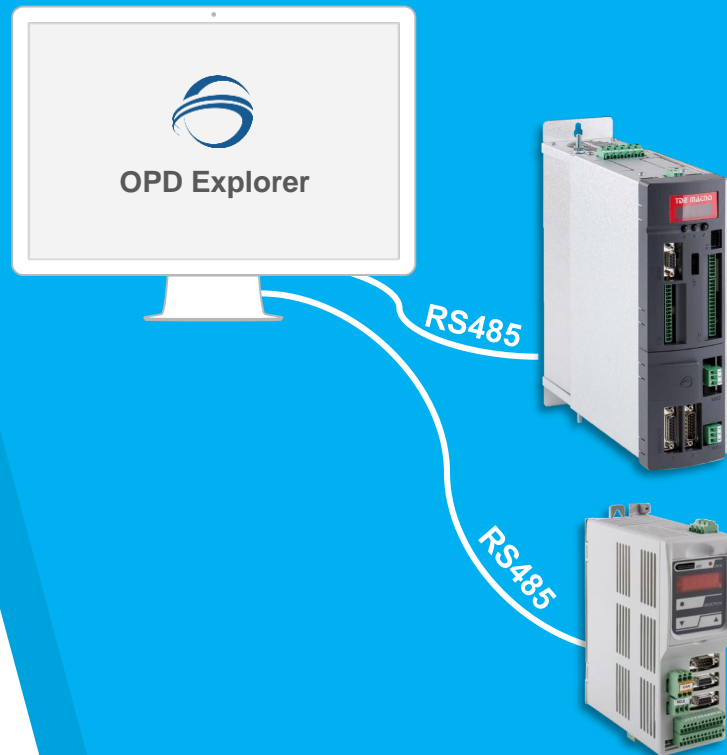


OPD Explorer

Developed under Windows environment
HTML, XML, with a control menu divided into
folders.

The OPD Explorer configuration tool allows to
configure and optimize the drive's performance.

- ▶ Procedure of assistance for the commissioning
and parameterization (Wizard) with access to
the motors and sensors database
- ▶ I/O management
- ▶ FSoftScope function: digital scope up to 8
values (realtime data sampling and displaying)
with settable pre/pos trigger
(tsampling=200microsec)

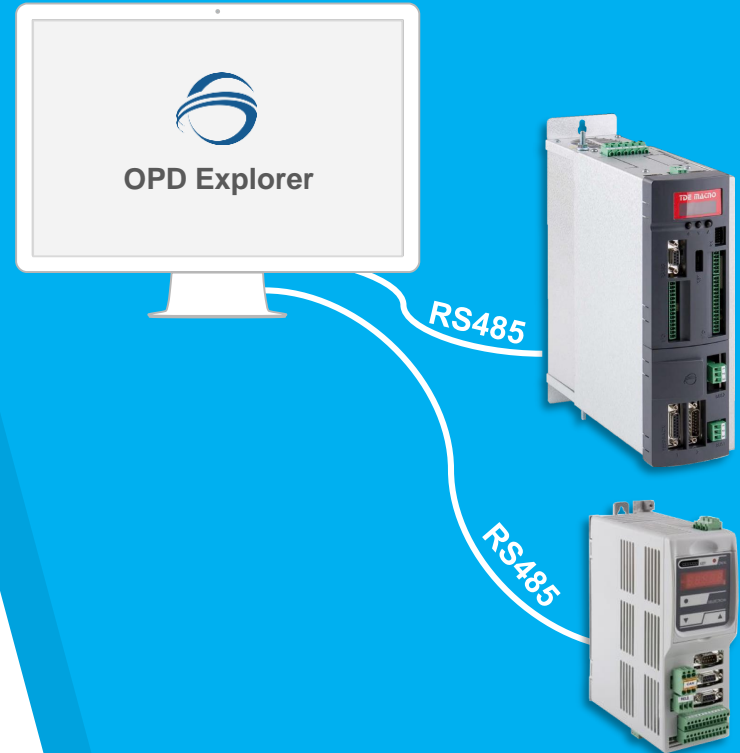


OPD Explorer

Developed under Windows environment
HTML, XML, with a control menu divided into
folders.

The OPD Explorer configuration tool allows to
configure and optimize the drive's performance.

- ▶ Parameters and variables configuration with
saving of the settings on both OPDExplorer and
programming key
- ▶ Download and upload management of the
parameters, firmware and applications
- ▶ Window and buffer of drive alarms (code,
description and time)
- ▶ Communication via Fieldbus



OPD Explorer

HTML pages divided
into folders

File Edit View Parameters Recipes Help

tree

Taglio

- OpenDrive Application_1
 - All parameters
 - Analog Reference
 - Frequency speed Reference
 - Digital inputs configurations
 - Digital outputs configurations
 - Analog outputs configurations
 - Frequency output
 - Acceleration ramps and speed limit
 - Torque and Current limits
 - Speed Control
 - Incremental position loop
 - Motor plate
 - Sensors
 - Autotuning control
 - Motor measured model
 - Supply voltage
 - Drive plate
 - ys
 - age/Flux control
 - ent control
 - control
 - nt overload
 - s parameters
 - protection
 - ommands and Control
 - ng

OpenDrive Application_1

OpenDrive Application Configuration

General

Name:

Communication

Protocol: **Modbus** [Configure](#)

Address:

Port: **COM:2**


Baud rate: [Advanced >>>](#)

Information

Status: **Disabled**

Firmware version:

Serial number:

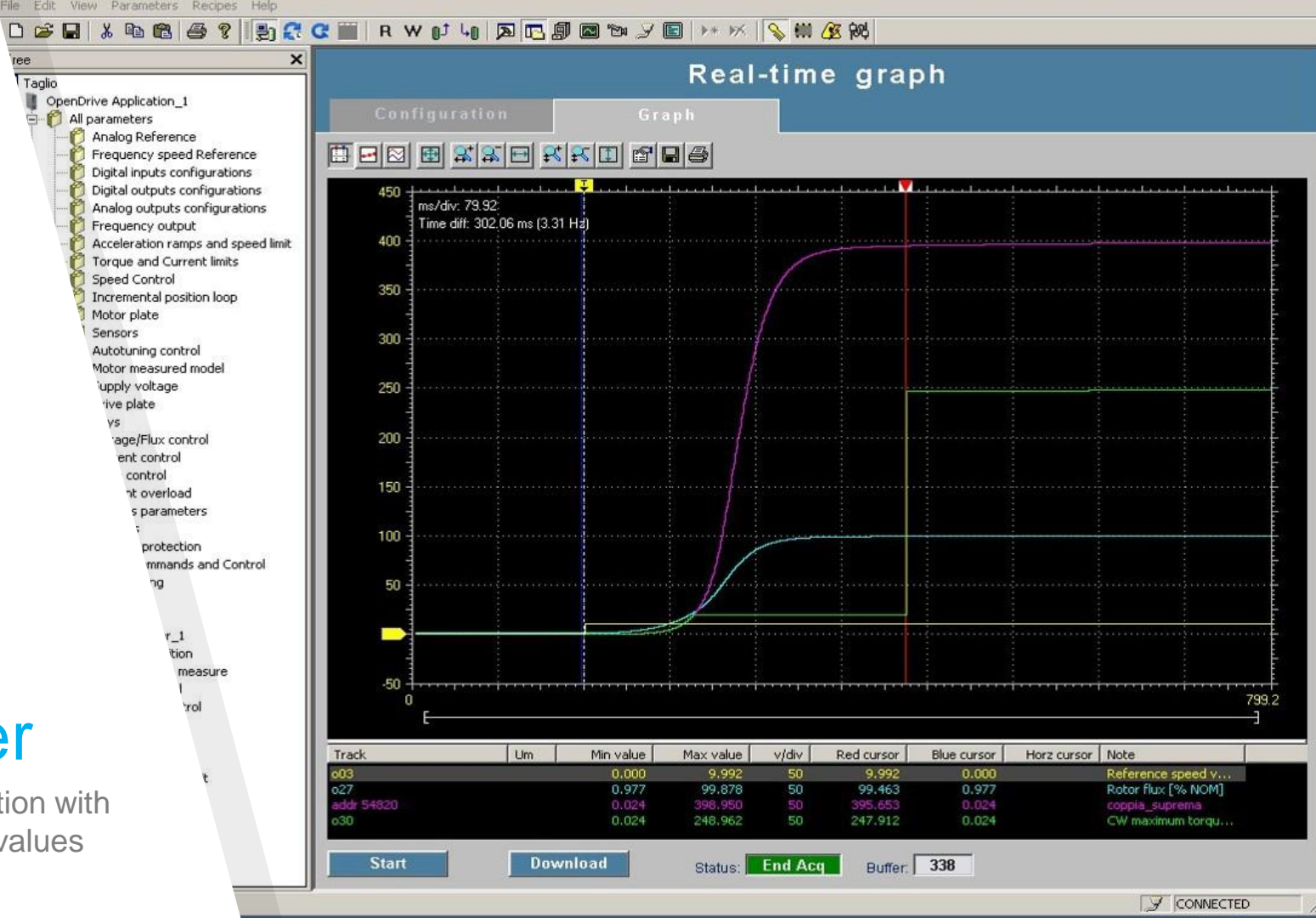


pendrive explorer

CONNECTED

OPD Explorer

SoftScope function with display up to 4 values



OPD Explorer

Download and upload management of the parameters, firmware and applications.

The screenshot displays the 'Cutter Synoptic' control interface within the OPD Explorer software. The interface is divided into several sections:

- Parameter Tree (Left):** A hierarchical list of parameters for 'OpenDrive Application_1', including 'All parameters', 'Analog Reference', 'Frequency speed Reference', 'Digital inputs configurations', 'Digital outputs configurations', 'Analog outputs configurations', 'Frequency output', 'Acceleration ramps and speed limit', 'Torque and Current limits', 'Speed Control', 'Incremental position loop', 'Motor plate', 'Sensors', 'Autotuning control', 'Motor measured model', 'Apply voltage', 'Motor plate', 'Voltage/Flux control', 'Position control', 'Control', 'Overload parameters', 'Protection', and 'Commands and Control'.
- Control Panel (Center-Right):**
 - Simulated speed line:** A numerical input field set to '100'.
 - CUT ENABLE:** A red toggle switch currently set to 'Off'.
 - Cut length A:** A numerical input field set to '500'.
 - Cut length B:** A numerical input field set to '1500'.
 - Max line speed:** A red numerical display showing '435.25'.
 - Marker phasing enable:** An unchecked checkbox.
 - Line speed (m/min):** A blue numerical display showing '0'.
 - Cuts counter:** A blue numerical display showing '0'.
 - Cut error length (mm):** A red numerical display showing '0'.
 - Top zero error (°):** A red numerical display showing '0'.
 - RUN:** A red toggle switch currently set to 'Off'.
 - ALARM RESE:** A red button.
 - Sync-Zone:** A horizontal arrow indicating the synchronization zone.
- Diagram (Center):** A schematic showing two rollers on a line, a motor, and a PLC. The motor is labeled '1175x854'. A '500' is indicated above the rollers. The PLC is connected to the 'Sync-Zone' and the 'ALARM RESE' button.
- Bottom:** A status bar showing 'CONNECTED'.

LogicLab

LogicLab is a multiplatform standard PLC IEC 61131-3 compliant integrated environment for PLC development

LogicLab is a multiplatform standard PLC IEC 61131-3 compliant integrated environment for PLC development.

Multi-platform environment (programming of PLCs, CNCs, regulators, drives etc.) for different hardware manufacturers and devices

The development environment is free and freely distributed



LogicLab

LogicLab supports all 5 programming languages of the standard IEC 61131-3

- | | | |
|-------|---------------------------|----------------|
| ▶ IL | Instruction List | Textual |
| ▶ ST | Structured Text | |
| ▶ LD | Ladder Diagram | |
| ▶ FBD | Function Block Diagram | Graphic |
| ▶ SFC | Sequential Function Chart | |

Applications on the Drive

The drive supplies all basic motor control functions (speed loop and current loop), the I/O management, sensors management, fieldbus management and more..



LogicLab

Available Resources

- ▶ 100 K word of program memory in flash
- ▶ 4 k word of data memory in RAM
- ▶ 15 K word of data memory on EEPROM
- ▶ Run time routine FAST = period PWM – 50 μ s (150 μ s at 5kHz)
- ▶ Direct connection to Modbus (functions “preset multiple registers” and “read holding registers” with mappable 4 K word)
- ▶ Direct connection to CanOpen up to 100 objects of the dictionary and possible configuration of 4 SDO, 4 TPDO and 4 RPDO



LogicLab

Available Resources

- ▶ 100 extra parameters available
- ▶ 64 internal values viewable on display and on OPD Explorer
- ▶ 32 input logic functions multiplexable on the physical inputs
- ▶ 32 output logic functions multiplexable on the physical outputs
- ▶ 32 monitor functions and/or analog outputs functions multiplexable on physical outputs



File Edit View Project Debug Communication Variables Window Tools Help

Project Speed

Name	Type	Address	Array	Init value	Attribute
1 Cnt_Marker_spazio	DINT	Auto	No	0	..
2 Cpt_Edge_Marker	Cpt_Edge_In	Auto	No	0	..
3 Cpt_Edge_Top0	Cpt_Edge_In	Auto	No	0	..
Delta_contra	REAL	Auto	No	n	

```

0001 (* Cattura Input Dig.3 TOP di zero Lama *)
0002 Cpt_Edge_Top0.Event := Capture_Edge_In3(ADR(Cpt_Edge_
0003
0004 (* Cattura Input Dig.2 FT Marker *)
0005 Cpt_Edge_Marker.Event := Capture_Edge_In2(ADR(Cpt_Edg
0006
0007 IF Cut_Enable THEN
0008 (* Gestione TOP di zero assoluto e calcolo nuova
0009 IF (Cpt_Edge_Top0.Event = 10) THEN (* Fronte di
0010
0011     new_PosSlave := Delta_OffsetTOP + TO_DINT
0012
0013     errore_TOP_letto := PosSlave - new_PosSlave
0014
0015     IF ((conta_TOP = 0) OR (NOT (on_stima_cut
0016
0017         PosSlave := new_PosSlave;
0018         Resto_attuale :=0;
0019     ELSE
0020         delta_quota := sysMechPosition - old_
0021         PosSlave:= PosSlave + delta_quota;
0022     END_IF;
0023     old_position := sysMechPosition;
0024     conta_TOP := conta_TOP + 1;
0025     IF (conta_TOP > 30000) THEN conta_TOP :=1
0026     END_IF;
0027
0028 ELSE
0029     delta_quota := sysMechPosition - old_posi
0030     PosSlave:= PosSlave + delta_quota;
  
```

Watch

Symbol	Value	Type
[SYSLOGICALINPUT	-	BOOL[]
[0]	FALSE	BOOL
[1]	FALSE	BOOL
[2]	FALSE	BOOL
[3]	FALSE	BOOL
[4]	TRUE	BOOL
[5]	FALSE	BOOL
[6]	FALSE	BOOL
[7]	FALSE	BOOL

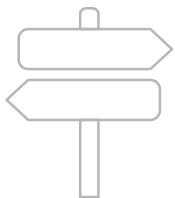
Library

Name	Type	Address	Size	Group
...				
sysAnalogInput	REAL	%ID3.0	4	I/O VARIABLES
sysAnalogOutput	REAL	%QD2.0	2	I/O VARIABLES
sysHwDigInpMask	WORD	%IW2.0	1	I/O VARIABLES
sysLogicalInput	BOOL	%IX0.0	8	I/O VARIABLES
sysLogicalOutput	BOOL	%QX0.0	4	I/O VARIABLES
sysTabDigInp	BOOL	%IX1.0	32	I/O VARIABLES
sysTabDigOutput	BOOL	%QX1.0	32	I/O VARIABLES

Operator and standard blocks | Target variables | Target blocks

EDIT MODE CONNECTED

LogicLab



FIND US



HQ

Via dell'Oreficeria, 41
36100 - Vicenza
Italy



TDE & HPB
Motion Control

Room 201, Building C, No.25,
Tian Ling Rd, Wu Zhong
Economic Development Zone
215168 - SuZhou City
China



Numerical Control
Application Department

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20092 - Cinisello Balsamo
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