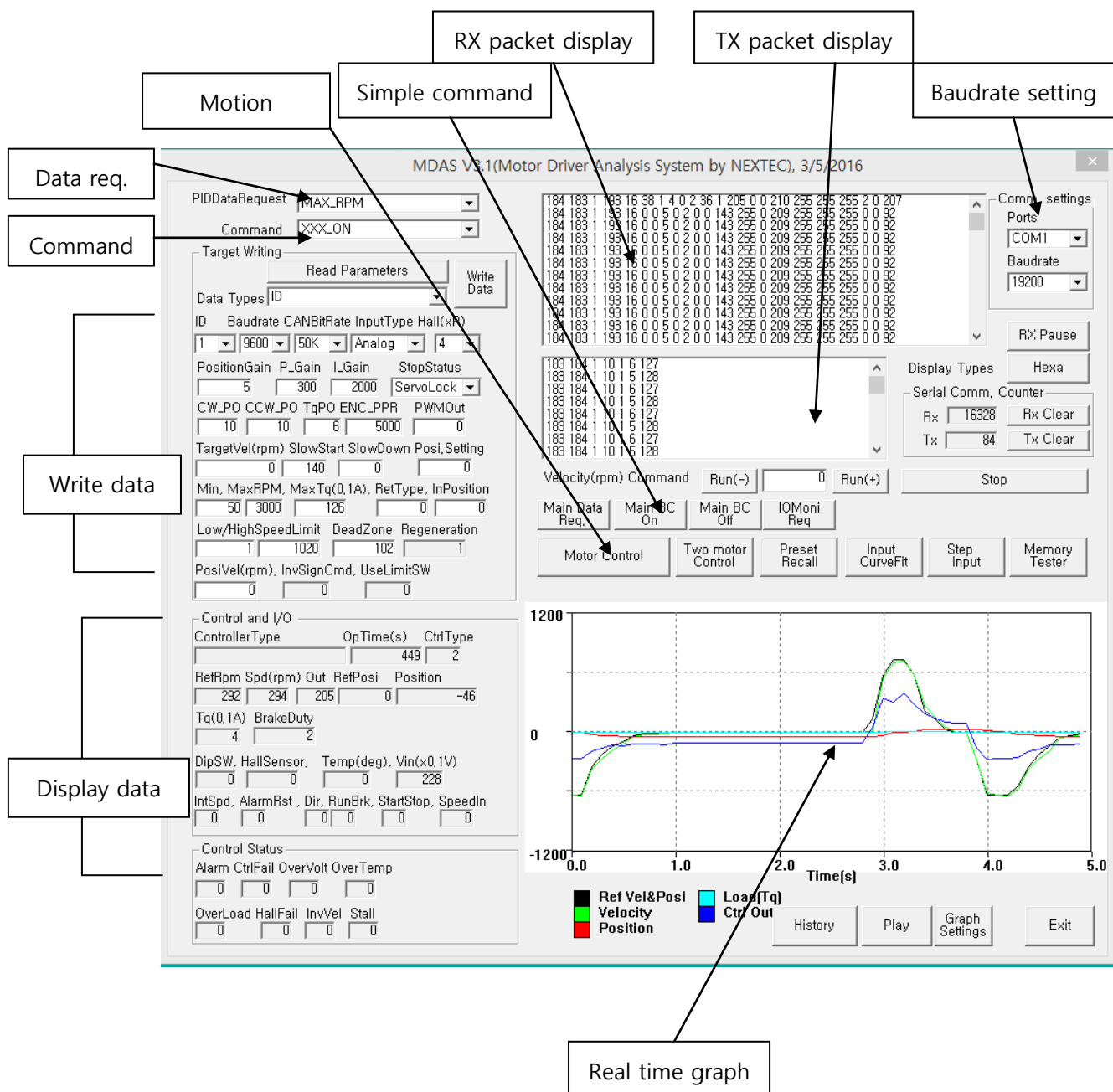
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## 1. Introduction

User manual for MDAS, communication test program on the BLDC/DC motor drivers of NEXTEC.


## 2. Main subject



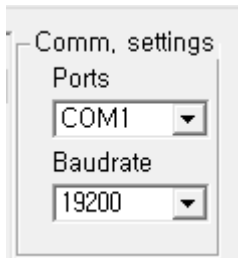
The screenshot shows the MDAS V2.1 software interface, titled "MDAS V2.1(Motor Driver Analysis System by NEXTEC), 3/5/2016". The interface is divided into several sections:

- Left Panel (Control and I/O):** Contains fields for "PIDDataRequest" (MAX\_RPM), "Command" (XXX\_ON), "Target Writing" (Read Parameters, Write Data), "Data Types" (ID, Baudrate, CANBitRate, InputType, Hall(xPR)), "PositionGain" (P\_Gain, I\_Gain, L\_Gain), "StopStatus" (ServoLock), "CW\_PO" (CCW\_PO, TqPO, ENC\_PPR, PWMOut), "TargetVel(rpm)", "SlowStart", "SlowDown", "Posi, Setting", "Min, MaxRPM, MaxTq(0.1A), RetType, InPosition", "Low/HighSpeedLimit", "DeadZone", "Regeneration", "PosiVel(rpm), InvSignCmd, UseLimitSW", "Control and I/O" (ControllerType, OpTime(s), CtrlType), "RefRpm, Spd(rpm), Out, RefPosi, Position", "Tq(0.1A), BrakeDuty", "DipSW, HallSensor, Temp(deg), Vin(x0.1V)", "IntSpd, AlarmRst, Dir, RunBrk, StartStop, SpeedIn", "Control Status" (Alarm, CtrlFail, OverVolt, OverTemp, OverLoad, HallFail, InvVel, Stall).
- Top Center:** "Simple command" label pointing to the "Command" field.
- Top Right:** "RX packet display" and "TX packet display" labels pointing to the packet data lists.
- Far Right:** "Baudrate setting" label pointing to the "Baudrate" dropdown menu.
- Bottom Left:** "Data req." and "Command" labels pointing to the "PIDDataRequest" and "Command" fields respectively.
- Bottom Center:** "Write data" label pointing to the "Write Data" button.
- Bottom Right:** "Display data" label pointing to the "Display Types" dropdown menu.
- Bottom Center (Graph):** "Real time graph" label pointing to the graph area.

The graph area shows a plot of "Time[s]" (0.0 to 5.0) on the x-axis and "Velocity(rpm)" (-1200 to 1200) on the y-axis. The legend indicates: Ref Vel&Posi (black), Velocity (green), Position (red), Load(Tq) (blue), and Ctrl Out (cyan). The graph shows a step response where the velocity (green line) rises from 0 to approximately 1000 rpm and then settles.

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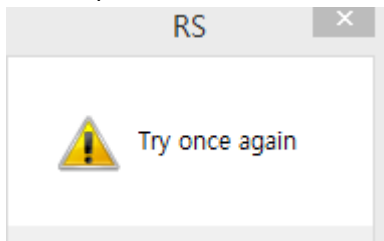
## 2.1 Commucation settings



Ports: choose comm. port from COM1 to COM9.

Baudrate : choose comm. baudrate, 9600, 19200, 38400, 57600, 115200 for serial commucation(RS485)

The baudrate of DC power controller is 19,200bps, default, and that of AC power controller is 9,600bps.



When user set the ports or buadrate, displayed the warnning, then try once again same setting action

## 2.2 RX packet display

Display RX packet data in real time.

If user don't want to display that real time packet, press RX Pause button placed right side.

User can see RX packet counter at the left side Serial Comm. Counter window.


To initialize(clear) the packet display window, press Rx Clear button.

To change the displayed packet to the type of Hexa, press Hexa button,

## 2.3 TX packet display

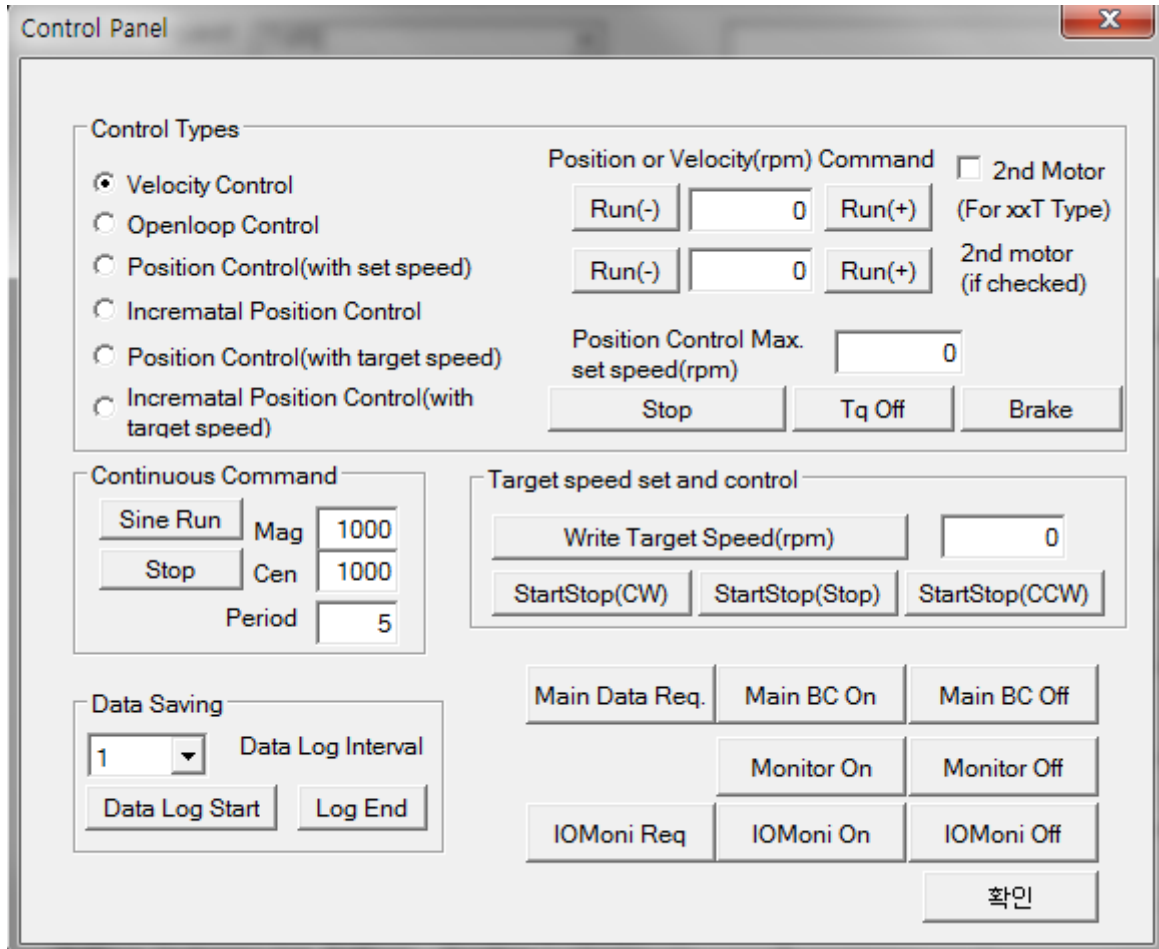
Display TX packet data in sending MDAS(user) to controller.

User can understand the structure of data packet from that sending packet format.

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## 2.4 Motion control

**Motor Control** : window for motion command.



**Control Types** : choose the control type by radio button.

- Velocity Control : speed control, the contents of edit box has unit of rpm(revolution per minute)
- Openloop Control : the range of openloop input is 0~1023(10bits)
- Position Control(with set speed): Position Control Max. Set speed(rpm)  
The max. speed is included , when user do not set that max. speed then the controller move to target position with the half of max. speed.
- Incremental Position Control: If the motor position is 100, then the input position is 100, the motor moves to the position of 200
- Position Control(with target speed) : Just send target position, then the max. speed is the target speed set by **Write Target Speed(rpm)** button

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**Continuous Command** : continuous sinusoidal command about 20 cycles per sec.

**Mag** : Magnitude of command

**Cen**: Data center

**Period**: Period of one cycle of sinusoidal command.

**Run(-)**, **Run(+)** : input the target speed or position or openloop output according to the control types in the edit box.

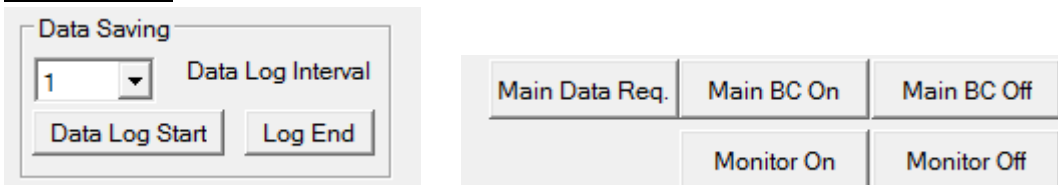
When the control type is positio, the position is 3 times of poles of motor.

**Stop** : Stop the motor by solw/start ratio.

**Tq Off** : Just reset the motor output, the the motor stops naturally.

**Brake** : Immediately stop the motor by short of motor coils

### **Data Saving**



Broadcasting command(BC) : call the receive packet with the period of 10Hz.

**Data Log Start** : data Logging start(makes file)

**File End** : Stop data logging, and make file with the name like 201305161845\_2.txt

This name is consist of Year/Date/Time/Minute/Serial number.

And the data logging save order is like, Data number, time, output, reference speed, speed, current, position


DataNum, Time(ms), CtrlOut, RefRPM, RPM, Current(0.1A), Position

1,60,-800,490,-240,515,32097

2,160,-800,490,-240,515,32018

3,260,-800,490,-240,515,31940

.....

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**Two Motor Control** : To control two motors at the same time, for the controller PNT50, MD750T

**Control on two motors** ✖

**Control types**

☒ Velocity Control(rpm)

☐ Openloop Control(0~1023)

☐ Position Control(32bits)

☐ Incremental Position Control

**Position settings**

Position Control    Set Position of Motor(32bits)

Max. Vel(rpm)

Req. MOT1 MainData

Req. MOT2 MainData

**Motor control panel**

Motor1(Left)

Motor2(Right)

Run(-)  
Run(+)

Run(+)

Run(+)

Stop

TqOff

Run(+)  
Run(-)

Run(+)

Run(+)

Stop

TqOff

All stop(RefVel->0)

Run(+)  
Run(-)

All brake

All TqOff

## 2.5 Brief command for broadcasting commucation

**Main Data Req** : request PID\_MAIN\_DATA .

**Main BC On** : start PID\_MAIN\_DATA broadcasting.

**Main BC Off** : stop PID\_MAIN\_DATA broadcasting.


**Monitor On** : start PID\_MONITOR BC

**Monitor Off** : stop PID\_MINITOR BC

**IOMoni On** : start PID\_IO\_MONITOR BC to see the input I/O status.

**IOMoni Off** : stop PID\_IO\_MINITOR BC

When use the controller PNT50 or MD750T , to request for the data of 2nd motor, check ☐2nd motor check box.

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## 2.6 Command

Data request combo box, and simple command box.

PIDDataRequest


MAX\_RPM

Command

XXX\_ON


Name	Contents	Remark
PID Data Request/ Request selected PID item(Parameter identification)	VEL_GAIN	Control gain(Position, Proportional, Integral)
	TYPE	Type of controller
	MAX_LOAD	Max. set current(0.1A unit)
	MAX_RPM	Max. speed
	VOLT_IN	Supply voltate(Vsupply) , unit of 0.1V
	TIME	Time(s) for motor moving
	ENC_PPR	Pulse per revolution on ENCODER
	TAR_VEL	When set the target speed by commucation, not by internal or external variable volume. Use that PID, then the CTRL I/O, start/stop, run/brake, cw/ccw are used with that target speed. If that target speed is zero, then the speed value is that of external volume.
	LOW_SPEED_LIMIT	The normal range of external volume is 0~1023, if user want to change the lowest speed range to 100~1023, then the 100 value is saved to that LOW_SPEED_LIMIT (less than 512)
	HIGH_SPEED_LIMIT	To change the upper range of external volume, use the item.(more than 512)
	SLOW_START	Set the value of SLOW_START(0~1023)
	SLOW_DOWN	Set the value of SLOW_DOWN(0~1023)

For more information, refer to the commucation specification.

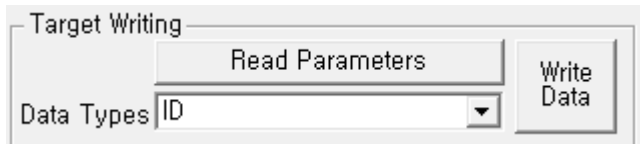
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Name	Content	Remark
Cmd(Command)/ Simple command like as stop, run, brake, Braodcasting on/off.	ALARM_RESET	Reset alarm.
	POSI_RESET	Position reset(position->0)
	MONITOR_BC_ON	Request monitor broadcasting
	MONITOR_BC_OFF	Stop monitor broadcasting
	FAN_ON	Forced on of FAN
	FAN_OFF	Forced stop of FAN
	CLUTCH_ON	Stop Clutch/Brake
	CLUTCH_OFF	Run Clutch/Brake
	TAR_VEL_OFF	Ignore the target speed set by PID_TAR_VEL
	SLOW_START_OFF	Ignore the slow/start ratio set by PID_SLOW_START, use internal volume SS.
	SLOW_DOWN_OFF	Ignore the slow/down ratio set by PID_SLOW_DOWN, use internal volume SD
	ENC_PPR_OFF	Do not use encoder set by PID_ENC_PPR

For more information, refer to the commucation specification.

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## 2.7 Write data




To write data to the controller, at first recommend to read the data from controller.

Press the **Read Parameters** button, then MDAS read all parameters of controller, and then choose the parameter to write in the combo box, then write target data to the edit box. And press the **Write Data** button to write(send packet).

Combo box	내 용	비 고(PID)
Target Writing/ Change parameters	DEFAULT_SET	Reset the parameters with default value.
	ID	Set ID number of controller
	BAUDRATE	Set comm. baudrate(RS485)
	GAIN	Set control gain
	INV_SIGN_CMD	Set the inverse of motor direction (when use two motors like as AGV)
	NORMAL_SIGN_CMD	Ignore that INV_SIGN_CMD
	LIMIT_SW_ON	When the command of comm. is activated the input pin. DIR, START/STOP of CTRL is used as limit switch for safety .
	LIMIT_SW_OFF	if user don't want that limit switch function then reset that LIMIT_SW_OFF
	TAR_VEL	To input more accurate target speed, set the target speed by TAR_VEL, then the value of external volume is ignored. But the CTRL I/O, START/STOP, RUN/BRAKE functionality is same.

For more information, refer to the communication specification.



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## 2.9 Data read/write and display

Read/write
Real only

**Target Writing**

Read Parameters
Write Data

Data Types ID ID

ID Baudrate CANBitRate InputType Hall(xP)

1
9600
50K
Analog
4

PositionGain P\_Gain L\_Gain StopStatus

0
0
0
TqOff

TqPGain, TqIGain, CWPO, CCWPO, EncoderPPR

0
0
0
0
0

TargetVel(rpm) SlowStart SlowDown Posi.Setting

0
0
0
0

Min, MaxRPM, MaxTq(0,1A), RetType, InPosition

0
0
0
0
0

Low/HighSpeedLimit, DeadZone, PWMOut

0
0
0
0

PosiVel(rpm), InvSignCmd, UseLimitSW, Regen,Brk

0
0
0
0

**Control and I/O**

ControllerType OpTime, CtrlType

0
0

RefRpm Spd(rpm) Out RefPosi Position

0
0
0
0
0

Tq(0,1A) BrakeDuty

0
0

DipSW, HallSensor, Temp(deg), Vin(x0,1V)

0
0
0
0

IntSpd, AlarmRst, Dir, RunBrk, StartStop, SpeedIn

0
0
0
0
0
0

1:Vel  
2:Posi  
3:Open  
4:Tq(cur)


**Control Status**

Alarm CtrlFail OverVolt OverTemp

0
0
0
0

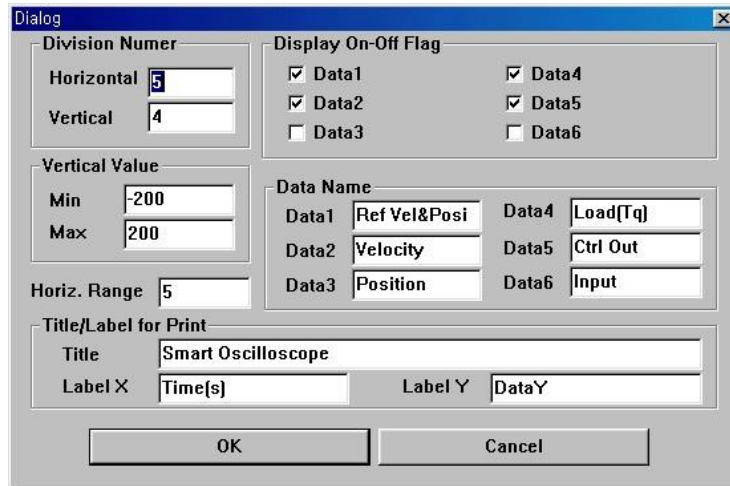
OverLoad HallFail InvVel Stall

0
0
0
0

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## 2. 10 Set the graph

Change the graphic parameters , vertical range, horizontal grid number, etc



## 2.11 Display window like as oscilloscope.

Display to the window of broadcasting data, user can observe the control status, output versus input.

**Play** : Display the graph by input data.

**Pause** : Pause the display data.

## 4 History

VERSION	DATE	CONTENTS
V2.7	2016.07.10	First born english manual for MDAS

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