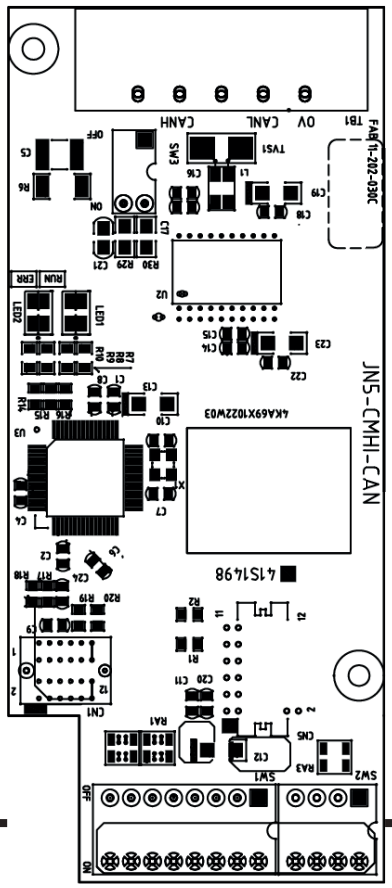

EXP-CAN-VDI

English

Instruction Manual

1S6N25EN - Rev 0.0 – 7-9-2020

GEFRAN

Thank you for choosing this Gefran product.
We will be glad to receive any possible information which could help us improve this manual. The e-mail address is the following: techdoc@gefran.com.
Before using the product, read the safety instruction section carefully.
Keep the manual in a safe place and available to engineering and installation personnel during the product functioning period.
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The data can only be used for the product description and they can not be understood as legally stated properties.

Table of Contents

1 Introduction

This product is the CANopen high-speed communication expansion card; it can perform remote setting and communication functions through the CANopen bus. It can only be used with the Gefran VDI100 drive (hereinafter referred to as the “driver”), and allow the driver to operate on the CANopen network.

1.1 Features and Supports

◆ Support functions:
1) Support CAN2.0A protocol.
2) Support CANopen DS301 V4.02.

◆ Support Services:
1) PDO (Processing data objects):
PDO1~PDO2：RxPDO maps out the writable device parameters; TxPDO maps out the readable device parameters. PDO message transmits real-time data by peer mode.

2) SDO (Service Data Objects):
SDO message configures the controlled node and each node to access the object dictionary. There are two kinds of SDO, request SDO and response SDO.

3) SOP (Special Object Protocol):
Support pre-defined Master/ Controlled connection default COB-ID.
Support broadcast services (when Address is 0).

4) Support SYNC Service:

5) NMT (Network Management)
Support NMT Module control
Support Boot-up
Support Baud Rate is 10kbps, 20kbps, 50kbps, 125kbps, 250kbps, 500kbps, 800kbps, 1Mbps

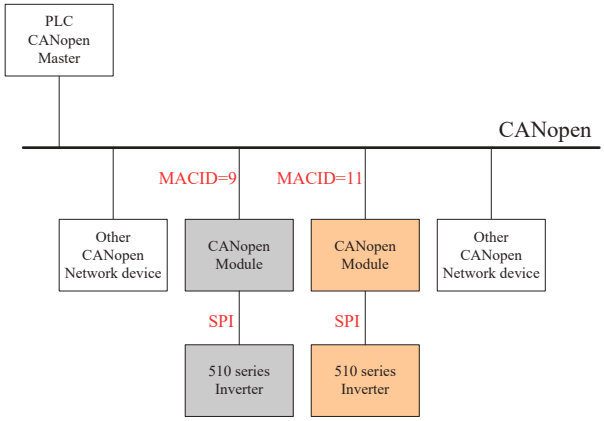
◆ Descriptions of Modbus communication with inverter
1) Support to read the state of VDI100 series inverter (run/stop, fault, warning signal).
2) Support to control the inverter’s run/stop, forward/reverse rotation and frequency command.
3) Support to control inverter’s acceleration/ deceleration time.

◆ Port connector and terminal functions:
- CANopen: 5-pin open pluggable connector; pin spacing 5.08mm
- Drive: CN2 connector on Control board.
  The communication module communicates with the drive through this interface.
  The drive provides power to the communication module through this interface.

◆ Network protocols:
- CANopen communication protocol
- Drive: Communication protocol

◆ Transmission method
SPI high speed communication

1.2 System Configuration Diagram



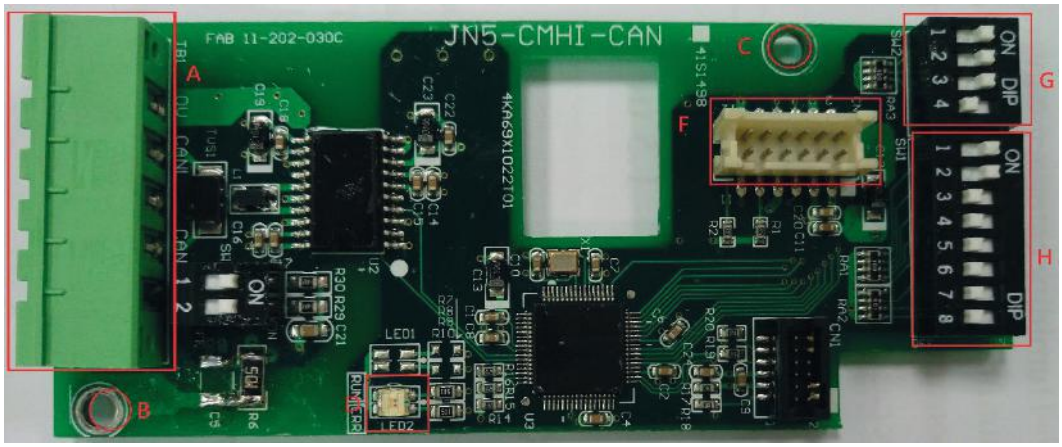
2. Installation

2.1 Mechanical installation

Refer to MTG EXP-CARDS-VDI100 manual it provides mechanical installation instruction of the communication expansion cards for VDI100.
You can find the MTG EXP-CARDS-VDI100 manual inside the EXP-PDP-VDI100 carton box, it is available on Gefran web site also.

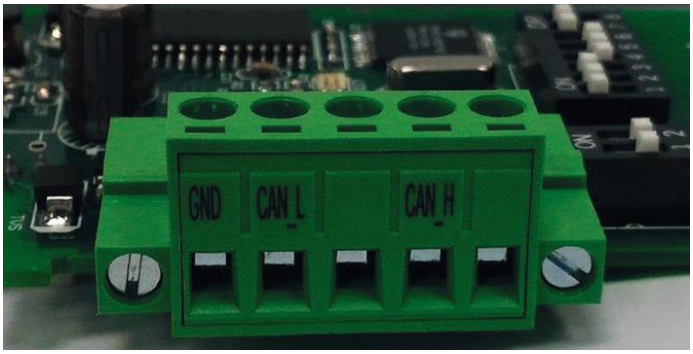
2.2 Installation instructions

It is suggested to use the device network connector and cables regulated by CIA.
Selection of cable types is to determine the maximum allowable length of bus and data transmission rate.



Ref.	Description
A	TB1 Terminal Block (CANopen bus connection)
B,C	Fixing holes
D	RUN LED
E	ERR LED
F	CN5 Control board connector
G	SW2 DIP switch (Rate setting)
H	SW1 DIP switch (ID address setting)

2.2.1 Terminal block TB1



in the order from left to right	
1	GND
2	CAN_L
3	NC
4	CAN_H
5	NC

2.3. Connection to SPI of VDI100

Communication module is set to fixed baud rate 19200bps, 8 bit data, 1bit stop, no parity bit and the communication protocol is ModBus RTU.

Connect with the inverter and the communication parameter setting is the followings.

Used to monitor the operability of the communication module CANopen network.
Users must first confirm related parameter settings on the driver in order to ensure that the communication module can connect normally.

Function	Description	Setting value	Default value
00-02	Main Run Command Source Selection	2:Communication Control	1
00-05	Main Frequency Command Source Selection	3: Communication Control (RS-485)	1
09-00	INV Communication Station Address	1	1

* Refer to the VDI100 User manual: communication port application for details of communication setting and wiring.

2.4 Termination Resistors

The first and the last communication station of device network are required to be connected to 120 Ω termination resistors between CAN_L and CAN_H.
EXP-CAN-VDI module provides termination resistors and it is required to turn on DIP switch SW3 while the module is used.

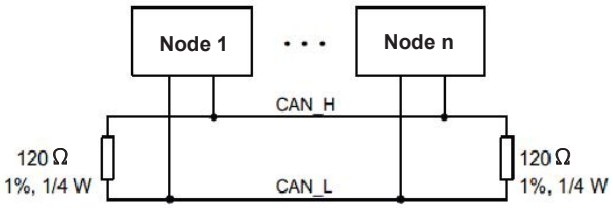


Figure 2.4.1 Termination resistors (RT) = 120Ω

2.5 Transmission Rate, Maximum Transmission Distance and Cable Length

The maximum allowable length of the bus depends on the type of cable used. The allowable cable types are as follows:

- Thin cable
- Thick cable
- Flat cable

Data transmission cable requirements regulated by ODVA (for Thick cable):

Serial transmission rate (kbps)	Maximum bus length (m)	Serial transmission rate (kbps)	Maximum bus length (m)
1000	25	125	500
800	50	50	1000
500	100	20	2500
250	250	10	5000

3 Operation

3.1 Network Function Setting

Setting of CANopen communication module network ID is required to be enabled before power on.
The setting range is 1~127.

3.2 Network Site Setting and Baud Rate Setting

Each node station needs a unique network site (MAC ID) in device network structure. User can assign it up to 127 sites (1~127) in this structure. Each MAC ID in the bus structure is required to be unique.
Set the node address by DIP switch SW1 (see below). If it performs reset, it is required to disconnect to be enabled.
As shown in the figure below, ID addresses (1~127) correspond to SW1 b1~b7.

CANopen communication module supports communication baud rate 10K … 1M. If it performs reset, it is required to disconnect to be enabled.
Setting value of DIP switch SW2 (when DIP switch is ON, the value is 1).
Transmission rate corresponds to SW2 b1~b3.

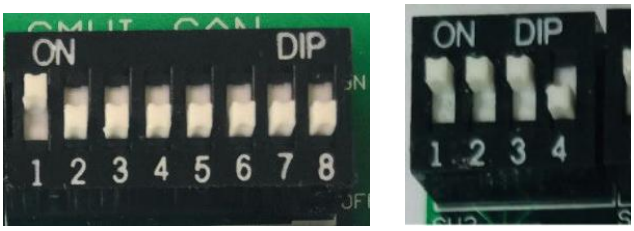


Figure 3.3.1: Dip switches SW1 and SW2

Function	DIP switch position	DIP switch status 7654321	Description
Network address Setting	SW1 b7—b1	0000000	Cannot be used
		0000001	Network address is 1
		0000010	Network address is 2
		0000011	Network address is 3
		.....	.....
		1111110	Network address is 126
		1111111	Network address is 127

Network address switch setting range: 1~127 (0, 128~255 cannot be used).

Function	DIP switch position	DIP switch status 321	Description
CANopen Transmission rate setting	SW2 b3—b1	000	10K
		001	20K
		010	50K
		011	125K
		100	250K
		101	500K
		110	800K
		111	1M

Transmission rate switch setting range: 0~7 (8~15 cannot be used).

3.3 LED State Display

The module has RUN (green) and ERR (red) indicators built-in used to quickly diagnose and monitor the communication statuses between the module itself and the bus.

Module status LED (RUN LED)
Used to monitor whether the equipment is operating normally.

Indicator statuses	Status name	Description
Does not light up	Initial status	Power not supplied
Continuous flashing	Pre-operation	Preparation status
Single flash	Stop	Stopping
Green light lights up	Operation	Operating

Error status LED (ERR LED)
Used to monitor the operability of the communication module CANopen network.

Indicator statuses	Status name	Description
Does not light up	No error	Operating
Single flash	Warning	Packet error
Double flash	Error	Guard/Heartbeat error
Red light lights up	Disconnected	Bus closed

4 Function Descriptions

4.1 Predefined Connection of EXP-CAN-VDI Module

0x1000~0x1FFF of object dictionaries and 0x2000~0x5FFF of manufactures custom zones are used in EXP-CAN-VDI module. These object dictionaries are in charge of the communication and data exchange of CANopen and CAN network. Index and sub-index are used to define the object dictionaries. Each of them has his data length (UIN8, UINT16, UIN32, etc.) and properties (RO, WO, RW, CONST, and MAPPALE). Data of the object dictionaries can be read and modified by SDO service.

Generally, there are one Master and some node stations in CANopen network and it usually used CANopen's pre-defined connection. Pre-defined connection is the interrelation of COB-ID related to communication and node ID.
To reduce network configuration workload, CANopen defines the allocation table of default identification symbol (CAN-ID). These symbols can be used in the pre-operation state and can be modified by dynamic allocation. CANopen device needs to provide the corresponding identification symbol for the supported communication objects.

Default ID allocation table is based on 11 bits CAN－ID. Among them, high 4 bits is for function code and low 7 bits is for Node-ID, set by DIP switch.
CAN identifier allocation table of EXP-CAN-VDI's CANopen predefined Master/ node station connection set.

Broadcasting objects of CANopen predefined Master/ node station connection set			
Objects	Function code (ID-bits 10-7)	COB-ID	Index of communication parameters in OD
NMT Module Control	0000	0000H	
SYNC	0001	0080H	1005H ， 1006H ， 1007H

Peer object of CANopen Master/ node station connection set			
Objects	Function code (ID-bits 10-7)	COB-ID	Index of communication parameters in OD
Urgent	0001	081H-0FFH	1024H ， 1015H
PDO1(Send)	0011	181H-1FFH	1800H
PDO1(Receive)	0100	201H-27FH	1400H
PDO2(Send)	0101	281H-2FFH	1801H
PDO2(Receive)	0110	301H-37FH	1401H
SDO(Send/ Server)	1011	581H-5FFH	1200H
SDO(Receive/ Client)	1100	601H-67FH	1200H
NMT Error Control	1110	701H-77FH	1016H-1017H

Notes:
1. PDO/ SDO sending/ receiving are observed by CAN node stations.
2. NMT error control includes Node Guarding, Heartbeat and Boot-up agreement.
EXP-CAN-VDI module supports Heartbeat production and Boot-up agreement.

4.2 Network Management Service (NMT)

1. Network management control (NMT Module Control)
EXP-CAN-VDI module supports network management commands defined by DS301. These commands are sent either from CANopen Master or other node stations. EXP-CAN-VDI module support node heartbeat production. The operation command is referred to the following table. When Node_ID = 0, all node station devices are controlled (in a broadcasting way).

NMT control command format

COB-ID (CAN-ID)	DLC	BYTE0	BYTE1
0x000	2	CS (command word)	NodeID (Node identifier)

NMT command word and corresponding functional services

CS (command word)	NMT service (control action)
0x01	Start node station device
0x02	Stop node station device
0x80	Make node station enter pre-operation
0x81	Reset node station
0x82	Reset node station communication

Node protection state value

Value	state
0x00	Initializing
0x02	Stopped
0x80	Operational
0x81	Pre-operational

4.3 Service Data Object (SDO)

Service data object is mainly for transmitting non-time critical data, like parameter value. User can access the items in device object dictionary via SDO. Object dictionary serves as the main data exchange medium between application layer and communication layer. All data in CANopen device can be managed in object dictionary. Every object dictionary item can be positioned with index and sub-index. Service data object (SDO) defined by CANopen is to access these items.
EXP-CAN-VDI module supports one SDO server so it can provide SDO service. SDO uses pre-defined connection to send and receive COB-ID, 0x580 + NodeID (sending) and 0x600 + NodeID (receiving).
A SDO message includes one set of COB-ID (requested SDO and responded SDO), and it can perform access action between two nodes. SDO can transmit any size of data, but it is required to use segment transmission way if it is over 4 bytes.
SDO has three kinds of transmission modes, acceleration transmission, segment transmission and block transmission. Acceleration transmission mode is often used in SDO of EXP-CAN-VDI.
COB ID of SDO communication is as follows:
• From Master to Follower: 600h + ID
• From Follower to Master: 580h + ID

Read: from Master to Follower (Request code: 0x40) / Master to slave: 600H + Node ID

COB-ID	Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
(600H) +Node-ID	Request Code	Object Index		Object sub-index	Request Data			
		LSB	MSB		Reserved			

Read: Slave response / slave to master: 580H + Node ID

COB-ID	Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
(580H) +Node-ID	Request Code	Object Index		Object sub-index	Request Data			
		LSB	MSB		bit0~bit7	Bit8~bit15	Bit16~bit23	Bit24~bit31

Response code (READ):
43H Read 4-byte data
4BH Read 2-byte data
4FH Read 1-byte data

Write: from Master to slave (4-byte data maximum)

COB-ID	Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
(600H) +Node-ID	Request Code	Object Index		Object sub-index	Request Data			
		LSB	MSB		bit0~bit7	Bit8~bit15	Bit16~bit23	Bit24~bit31

Request code (WRITE):
23H Write 4-byte data
2BH Write 2-byte data
2FH Write 1-byte data

Write: from slave to Master (Response code: 0x60H)

COB-ID	Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
(580H) +Node-ID	Response Code	Object Index		Object sub-index	Request Data			
		LSB	MSB		Reserved			

When we use SDO to perform control to the group 25H of the driver control group, corresponding rules are as follows:

Index
25xxH (register address)

For example, when we want to perform write/read to 2501H of the control group, the corresponding SDO object index is the control group register address 2501H.
Perform operation with index 2501H directly and the module will automatically convert to the VDI100 2501H control group register address to perform operation.

4.4 Process Data Object (PDO)

Operating modes in PDO are production/ consumption. Each network node can learn the messages of transmitting nodes and judge if it is required to deal with it after receiving messages. PDO data transmitting ways can be one to one or one to many. Each PDO message contains transmitting PDO (TxPDO) and receiving PDO (RxPDO) message. Transmitting ways are defined in PDO communication parameter index (the first group to receive PDO messages index is 1400h, the first group to transmit PDO messages index is 1800h, the second group to receive PDO messages index is 1401h, and the second group transmit PDO messages index is 1801h. PDO transmitting way is shown as the following table:

Type Numbers	PDO Transmitting Types				
	Cyclic	Acyclic	Synchronous	Asynchronous	RTR only
0		○	○		
1-240	○		○		
241-251					
252			○		○
253				○	○
254				○	
255				○	

Type No 1-240 presents synchronization messages (SYNC) numbers between two PDO transmitting messages.
Type No 252 presents promptly updating data upon receiving SYNC messages.
Type No 253 presents promptly updating data upon receiving RTR messages.
Type No 254 presents not supporting.
Type No 255 presents asynchronous transmitting messages.
For VDI100-CANopen module, transmitting modes of TPDO supports are the followings:

- 1-240 transmission in a synchronous and periodic ways: Data receiving SYNC of No. N is collected and updated in packets and then is transmitted on the bus. Transmission type corresponding to the setting value is N.
- 254-255 transmission in an asynchronous way: Module will trigger transmitting data after experiencing event time and it is required to restrict the time interval at each transmitting data period.

Note: EXP-CAN-VDI module supporting RPDO transmitting way is synchronous and aperiodic (0), synchronous trigger mode (1--240), and asynchronous way (254,255). It is suggested RPDO transmitting property is asynchronous way. When RPDO transmits in a synchronous and periodic way, it is suggested the number be not less than 10. TPDO supporting trigger way is synchronous or asynchronous (1--240) and it is suggested synchronous and periodic system setting not be less than 100MS.

Inhibit Time
Definition of inhibit time is to prevent TPDO from sending frequently and taking up a lot of bus bandwidth so as not to affect the bus communication. Thus, the shortest time interval (unit: ms) of TPDO sending PDO is defined. When this parameter is 0, it is disabled. It is defined in communication parameter sub-index 3.

Event Time
This parameter defines PDO sending cycle time (unit: ms) and it is required to set PDO transmission type to be 254 or 255. When this parameter is 0, it is disabled. It is defined in communication parameter sub-index 5.

4.5 Object index list

Basic index

Index	Sub	Definition	Default Value	R/W	Size	Notes
1000H	0	Device type	00010192H	R	U32	
1001H	0	Error register	0	R	U8	
1005H	0	COB-ID SYNC message	80H	R	U32	
1006H	0	Communication cycle period	0	RW	U32	synchronous and periodic communication
1008H	0	Manufacturer device name	EXP-CAN-VDI	R	U32	
1009H	0	Manufacturer hardware version	1.0	R	U32	
100AH	0	Manufacturer software version	1.00	R	U32	
1014H	0	COB-ID emergency	00000080H+Node-ID	R	U32	
1015H	0	Inhibit time EMCY	0	RW	U16	
1016H	0	number of entries	1	R	U8	
	1	Consumer heartbeat time	0	RW	U32	Not supported
1017H	0	Producer heartbeat time	0	RW	U16	Unit: 1ms
1018H	0	number of entries	3	R	U8	
	1	Vender ID	00000373H	R	U32	
	2	Product code	0000100H	R	U32	
	3	Revision	00010000H	R	U32	
1200H	0	Server SDO Parameter	2	R	U8	
	1	COB-ID Client -> Server	0000600H+Node-ID	R	U32	
	2	COB-ID Client <- Server	0000580H+Node-ID	R	U32	
1400H	0	Number of entries	2	R	U8	
	1	COB-ID used by PDO	0x00000200H+Node-ID	RW	U32	
	2	Transmission Type	0XFF	RW	U8	
1401H	0	number_of_entries	2	R	U8	
	1	COB-ID used by PDO	00000300H+Node-ID	RW	U32	
	2	Transmission Type	0XFF	RW	U8	
1600H	0	number_of_entries	2	RW	U8	
	1	1.Mapped Object	60420010H	RW	U32	
	2	2.Mapped Object	60420010H	RW	U32	
	3	3.Mapped Object	0	RW	U32	
	4	4.Mapped Object	0	RW	U32	
1601H	0	number_of_entries	2	RW	U8	
	1	1.Mapped Object	604F0010H	RW	U32	
	2	2.Mapped Object	60500010H	RW	U32	
	3	3.Mapped Object	0	RW	U32	
	4	4.Mapped Object	0	RW	U32	
1800H	0	number_of_entries	5	R	U8	Entry numbers
	1	COB-ID used by PDO	00000180H+Node-ID	RW	U32	
	2	Transmission Type	0xFF	RW	U8	Transmission Type
	3	Inhibit time	0x64	RW	U16	Inhibit time

Index	Sub	Definition	Default Value	R/W	Size	Notes
	4	CMS-Priority Group	0	RW	U8	
	5	Event timer	0x64	RW	U16	Event timer
1801H	0	number_of_entries	5	R	U8	Entry numbers
	1	COB-ID used by PDO	00000280H+Node-ID	RW	U32	
	2	Transmission Type	0xFF	RW	U8	
	3	Inhibit time	0x64	RW	U16	Inhibit time
	4	CMS-Priority Group	0	RW	U8	
	5	Event timer	0x64	RW	U16	Event timer
1A00H	0	number_of_entries	2	RW	U8	
	1	1.Mapped Object	60400010	RW	U32	
	2	2.Mapped Object	60420010	RW	U32	
	3	3.Mapped Object	0	RW	U32	
	4	4.Mapped Object	0	RW	U32	
1A01H	0	number_of_entries	2	RW	U8	
	1	1.Mapped Object	604F0010	RW	U32	
	2	2.Mapped Object	60500010	RW	U32	
	3	3.Mapped Object	0	RW	U32	
	4	4.Mapped Object	0	RW	U32	

DS402 part

index	Sub-index	Definition	Default Value	R/W	Size	Units/ mode	PDO MAP
603F	0	Error code	0	RO	U16		Yes
6041	0	Status word	0	RO	U16		Yes
6043	0	vl velocity demand	0	RO	S16	Hz vl	Yes
6040	0	Control word	0	RW	U16		Yes
6042	0	vl target velocity	0	RW	S16	Hz vl	Yes
604F	0	vl ramp function time acceleration time	10000	RW	U32	0.1S vl	Yes
6050	0	vl slow down time deceleration time	10000	RW	U32	0.1S vl	Yes

4.6 Definition of DS402 Data

603F: Record error code of node station n
6041: Display the current inverter's state (run/stop)
6043: Display the current speed command value, which is S16 data type.
The highest bit indicates forward/ reverse rotation. 0: forward rotation; 1: reverse rotation.
Less than 15 bits indicates the current frequency value and this value is 50 times of actual output frequency value.

Eg, When 6043 display value is hex of 4E20, the highest bit value is 0 (forward rotation). Less than 15 bits value converted to the value at decimal is 20000 and the actual output speed should be 400.00 Hz. If it displays A120, the highest bit value is 1 (reverse rotation). Less than 15 bits value is 2120, converted to the frequency value is 2120(H) = 8480(D), f=8480(D)/50=169.6Hz. So 6043 displaying A120 indicates the inverter's frequency value is 169.6 Hz (reverse rotation state).
6040：control word, hex data type and bit0 controls inverter's state (Run/Stop). 1: RUN, 0: STOP
Bit7:　1: Fault Reset. When bit7 is 1, clear the current resettable error; when bit7 is 0, it cannot reset the current error.
6042：control inverter's forward/ reverse rotation and operation frequency. Bit15: 1: reverse rotation; 0: forward rotation, which is not counted in frequency operation. Bit14~Bit0 presents hex of frequency command and the actual output frequency = (Input frequency which is converted into decimal value*2)/100.
Ex: When 6042 is 2452H, the highest bit = 0 presents forward rotation. If Bit14~Bit0 = 010 0100 0101 0010(B), the converted decimal value is 9298(D) and the actual output frequency value is 9298*2/100=185.96HZ; similarly, when 6042 is A452(H), the actual output frequency value is 185.96HZ and it presents reverse rotation.

604F: Set the acceleration time of VDI100, and the actual acceleration time is (604F/10).
6050: Set the deceleration time of VDI100, and the actual deceleration time is (6050/10).

Note: When it sends out the data, the low bit is at the front and the high bit is behind it.

4.7 Control Group Address for VDI100

EXP-CAN-VDI module provides the operation of inverter's control group via SDO command.
Refer to next section for specific operation way. The address is as follows:

4.7.1 Command DATA (allows reading and writing)

Register Address		Bit	Content
2500H	Reserved		
2501H	Operation Signal	0	Operation Command 1 : Run 0 : Stop
		1	Reverse Command 1 : Reverse 0 : Forward
		2	External Fault 1 : Fault
		3	Fault Reset 1 : Reset
		4	Reserved
		5	Reserved
		6	Multi-function Comm S1 1 :"ON"
		7	Multi-function Comm S2 1 :"ON"
		8	Multi-function Comm S3 1 :"ON"
		9	Multi-function Comm S4 1 :"ON"
		A	Multi-function Comm S5 1 :"ON"
		B	Multi-function Comm S6 1 :"ON"
		C	Multi-function Comm S7 1 :"ON"
		D	Multi-function Comm S8 1 :"ON"
		E	Controller mode 1 : "ON"
		F	Communication setting torque command 1: "ON"
2502H		Frequency Command (Unit: 0.01Hz)	
2505H		AO1 (0.00V ~ 10.00V)	
2506H		AO2 (0.00V ~ 10.00V)	
2507H		DO	
2510H		G12-00 H-WORD	
2511H		G12-00 L-WORD	

4.7.2 Monitor DATA (read only)

Register Address		Bit	Content
2520H	Status Signal	0	Operation status 1 : Run 0 : Stop
		1	Direction status 1 : Reverse 0 : Forward
		2	Frequency converter operation preparation status 1: Preparation complete 0: Preparation not yet complete
		3	Error 1 : Abnormal
		4	Warning 1: "ON"
		5	Zero speed 1: "ON"
		6	Model 440 1 :"ON"
		7	Frequency reached 1 :"ON"
		8	Any frequency reached 1 :"ON"
		9	Frequency detection one 1 :"ON"
		A	Frequency detection two 1 :"ON"
		B	Low voltage 1 :"ON"
		C	Frequency converter no output 1 :"ON"
		D	Frequency not according to communication 1 :"ON"
		E	Operation not according to communication 1 : "ON"
		F	Over-torque 1: "ON"

Register Address		Bit	Content							
2521H	Error description	0	Reserved	31	Under Torque 1					
		1	UV (Under-voltage)	32	Under Torque 2					
		2	OC (Over-current)	33	CF02					
		3	OV (Over-voltage)	34	CF03					
		4	OH1 (Heat sink overheat)	35	CF04					
		5	OL1 (Motor overload)	36	Reserved					
		6	OL2 (Frequency converter overload)	37	Reserved					
		7	OT (Over-torque)	38	CF07 (Motor control fault)					
		8	UT (Under-torque)	39	Reserved					
		9	SC (Short circuit)	40	Reserved					
		10	GF (Ground fault)	41	Reserved					
		11	FO	42	Reserved					
		12	IPL (Input phase loss)	43	Reserved					
		13	OPL (Output phase loss)	44	Reserved					
		14	OS	45	Reserved					
		15	PGO	46	OH4 (Motor overheat)					
		16	DEV	47	Reserved					
		17	EF1	48	Reserved					
		18	EF2	49	MtrSw (DI Motor Switch Fault)					
		19	EF3	50	OCA (Acceleration over-current)					
		20	EF4	51	OCD (Deceleration over-current)					
		21	EF5	52	OCC (Operation over-current)					
		22	EF6	53	CF08					
		23	EF7	54	PTCLS					
		24	EF8	55	PF (Protection fault)					
		25	FB (PID feedback signal error)	56	TOL					
		26	OPR(Keypad Removed)	57	STO2 (Safety switch 2)					
		27	Reserved	58	Reserved					
		28	CE	59	Reserved					
		29	STO (Safety switch 1)	60	Reserved					
		30	Reserved	61	Reserved					
2522H	DI status	0	Multi-function terminal S1	4	Multi-function terminal S5	8~F	Reserved			
		1	Multi-function terminal S2	5	Multi-function terminal S6					
		2	Multi-function terminal S3	6	Multi-function terminal S7					
		3	Multi-function terminal S4	7	Multi-function terminal S8					
2523H		Frequency command (0.01Hz)								
2524H		Output frequency (0.01Hz)								
2526H		DC voltage command (0.1V)								
2527H		Output current (0.1A)								
2528H	Warning description	0	No alarm	30	RDE	60	Reserved			
		1	OV	31	WRE	61	RETRY			
		2	UV	32	FB	62	SE07			
		3	OL2	33	VRYE	63	Reserved			
		4	OH2	34	SE01	64	Reserved			
		5	Reserved	35	SE02	65	OH1			
		6	OT	36	SE03	66	FIRE			
		7	Reserved	37	Reserved	67	ES			
		8	Reserved	38	SE05	68	STP1			
		9	UT	39	HPERR	69	BDERR			
		10	OS	40	EF	70	EPERR			
		11	PGO	41	Reserved	71	Reserved			
		12	DEV	42	Reserved	72	Reserved			
		13	CE	43	RDP	73	STP0			
		14	CALL	44	Reserved	74	Reserved			
		15	Reserved	45	OL1	75	STP2			

Register Address		Bit	Content				
		16	EF0	46	Reserved	76	RUNER
		17	EF1	47	Reserved	77	LOC
		18	EF2	48	Reserved	78	PTCLS
		19	EF3	49	BB1	79	Sys Init
		20	EF4	50	BB2	80	FBLSS
		21	EF5	51	BB3		
		22	EF6	52	BB4		
		23	EF7	53	BB5		
		24	EF8	54	BB6		
		25	Reserved	55	BB7		
		26	Reserved	56	BB8		
		27	Reserved	57	Reserved		
		28	Reserved	58	Reserved		
		29	Reserved	59	Reserved		
2529H		DO status					
252AH		AO1					
252BH		AO2					
252CH		AI 1 input (0.1%)					
252DH		AI 2 input (0.1%)					
252FH		VDI100 Check					

Note: Write in zero for Not used BIT, do not write in data for the reserved register.

4.7.3 Operation on Inverter Control Group via SDO command

When we use SDO to control the drive control group 25H group, the corresponding rules are as follows:

Index	**sub-index**
25xxH (register location)	-

I.e.: when we want to write/read to 2501H of the control category, the object index (index) corresponding to SDO is the control class register address 2501H.
Operate directly with the index 2501H, and the module will automatically convert to the address of the control type temporary memory addresser of VDI100 2501H.

5. Troubleshooting

There are two indicators on top of the CANopen communication module; when malfunction occurs, the cause of the malfunction can be confirmed based on the indicator statuses, and troubleshoot the error by following the descriptions below.

Module status LED (RUN LED)

Indicator statuses	Status name	Troubleshooting method
Does not light up	Power not supplied to the communication module	1) Confirm whether the driver power is normal. 2) Confirm whether the power terminal of the communication module is connected to the driver.

Error status LED (ERR LED)

Indicator statuses	Status name	Description
Single flash	CANopen packet error	Poor connection quality with the CANopen host terminal or host not connected when powered on. Continue transmission or power off inspection can be selected. Two results can be expected with continue transmission 1) Packet transmission returns to normal and the red light no longer flashes 2) Packet continues to have errors causing disconnection. When the power is off, check whether the TB1 terminal and cable are firmly connected, and whether the transmission rate, maximum transmission distance and cable length comply with ODVA specifications.
Double flash	Guard/Heartbeat error	User sends periodic heartbeat messages. If a message is not received after a specific time, please disconnect the power and check the connection status of that node.
Red light lights up	Disconnected	Cannot connect with the CANopen host terminal; disconnect the power and check whether the TB1 terminal and cable is firmly connected, and whether the transmission rate, maximum transmission distance and cable length comply with ODVA specifications.

6. EDS file of EXP-CAN-VDI

When using the CANopen communication module, if the EDS description file is needed, please download the EXP-CAN-VDI.esd file from the download area of VDI100 NEW of www.gefran.com

EDS FILE, EXP-CAN-VDI.eds file https://www.gefran.com/it/it/download/5188/attachment/all	

7. GF_Net Setting