

Operation & Service Manual VR10 / VR15 With CANopen Interface





Before starting work read these instructions.

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IMI



Change history:

The change history reflects all changes of the Operation & Service Manual, which were done after the initial release.

Index	Chapters	Change description	Date	Name
001	1,2,3,4,6,7,8,9	Changes of content	3-Apr-2023	Cong, JSensor
2	All	First review	24/04/23	RL
3	4.3, 3.1	Removed overcurrent protection line Removed reference to CiA in section 3.1	26/04/23	RL
4	All	Second review	29/06/23	RL
5	All	User test changes, new connectors, +	04/10/23	RL

This Operation & Service Manual makes no claims of being complete as it does not cover all variants of the VR10 / VR15 valve islands.

Therefore, this document is subject to extensions or changes.



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2. About this Documentation

This User Guide contains the information to set up and operate VR10 / VR15 valve island with CANopen Interface and to detect and resolve problems.

Note:

In addition to the specific information for the CANopen variants, all data sheets and VR10 / VR15 PROTOCOL / MULTIPOLE SERIES IP65 VERSION Operation & Service Manual are applicable and remain valid.

Refer also to the data sheets on the following web link:

https://www.norgren.com

Refer also to the valve island installation instruction in the following document:

- "VR10 / VR15 PROTOCOL / MULTIPOLE SERIES IP65 VERSION Operation & Service Manual"
- ► This manual can be found on <u>https://www.norgren.com/uk/en/technical-support/installation-maintenance-instructions/</u><u>valves</u>

Basic information about CANopen could be found in the following documents:

- CAN knowledge: <u>https://www.can-cia.org/can-knowledge/</u>
- Specifications: <u>https://can-cia.org/groups/specifications/</u>

Further information about CANopen is available on following websites:

• <u>https://www.can-cia.org/</u>



3. Important Hints

3.1. Grounding and Equipotential Bonding

Proper grounding and equipotential bonding are very important to protect against electromagnetic interference in CANopen networks. To reduce potential impact, grounding of the CANopen cable screen should be done at both ends of every cable (i.e., at each device). Equipotential bonding ensures that the ground potential is identical throughout the entire CANopen network and is essential to avoid equipotential bonding currents, which could otherwise flow through the CANopen cable screen.

For proper grounding please use the earth screw (M4) on the upper side of the valve island. For easy reference see item 6 in chapter 4.



4. Electrical Components



- 1- Port 1 for BUS IN
 - (M12 x 1 | Male | 5 pin | A coded | green insert)
- 2- Port 2 for BUS OUT (M12 x 1 | Female | 5 – pin | A – coded | green insert)
- 3- PWR: Power supply connector

(M12 x 1 | Male | 5 - pin | A - coded | black insert)

- 4- Status LEDs
- 5- Bit rate and node-ID switches
- 6- Earth screw (M4)
- 7- Valve status LEDs

NOTE: VR1X supports up to 24 solenoids. A valve station can contain 1 or 2 solenoids.



4.1. CANopen BUS OUT and BUS IN – green insert

BUS OUT



M12 / 5 pins / (BUS OUT) Female Connector / A-coded

Pin No.	Name	Function
1	Drain	
2		
3	V-	GND
4	CAN_H	SIGNAL
5	CAN_L	SIGNAL

BUS IN



M12 / 5 pins / (BUS IN) Male Connector / A-coded	
--	--

Pin No.	Name	Function
1	Drain	
2		
3	V-	GND
4	CAN_H	SIGNAL
5	CAN_L	SIGNAL

Note that V- should be connected to GND to provide correct CAN operation.

The device does not include a bus termination resistor.



4.2. POWER SUPPLY CONNECTOR - black insert

▶ Pin allocation of power supply connector



M12 / 5 pins	/ Male Connector /	A-coded
--------------	--------------------	---------

Pin No.	Name	Function						
1	L1 (VB+)	Electronics power supply						
2	N2 (VA-)	OV valves power supply						
3	N1 (VB-)	OV electronics power supply						
4	L2 (VA+)	Valves power supply						
5	FE	Functional earth						



WARNING!

Observe the voltage of the valve island carefully! Do NOT connect 24V to a 12V product! Over-voltage may cause irreversible damage and excess heating of the product. Risk of fire! Risk of burns!

Power supply connector wiring diagram



Notes:

- Make sure electronics power, valves power and their polarities are connected to correct pins respectively before switching on.
- ► Select the appropriate cables to mate with the connectors mounted on the control module.
- ▶ Connect the earth screw to ground.

4.3. ELECTRICAL DATA

Specification			Remark
Valve voltage range VA	24VDC ±10%	12VDC ±10%	PELV
Electronics voltage range VB	24VDC ±30%	12VDC ±30%	PELV
Maximum current VA	1A (24 solenoids)	2A (24 solenoids)	
Maximum current VB	50mA	100mA	
Voltages are galvanic decoupled	Yes		
Protection against polarity reversal	Yes		
Output polarity	PNP		
Bus termination resistor	No termination included		



5. Solenoid Number, Output Point & Valve Station Mapping

VR1X only supports 24 solenoids. A valve station can contain 1 or 2 solenoids.

5.1. MAPPING RULES FOR VALVE STATIONS ≤ 12

► If valve stations ≤ 12, 2 solenoid numbers are always reserved for each valve station. *

Detailed allocation is shown as below:

Station	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12
Solenoid A	Sol.01	Sol.03	Sol.05	Sol.07	Sol.09	Sol.11	Sol.13	Sol.15	Sol.17	Sol.19	Sol.21	Sol.23
(14 Solenoid)	Output 0	Output 2	Output 4	Output 6	Output 8	Output 10	Output 12	Output 14	Output 16	Output 18	Output 20	Output 22
Solenoid B	Sol.02	Sol.04	Sol.06	Sol.08	Sol.10	Sol.12	Sol.14	Sol.16	Sol.18	Sol.20	Sol.22	Sol.24
(12 Solenoid)	Output 1	Output 3	Output 5	Output 7	Output 9	Output 11	Output 13	Output 15	Output 17	Output 19	Output 21	Output 23

Notes:

* For valve station with single solenoid, only Solenoid A (14 Solenoid) is connected.

Consider the one which is closest to control module as 1st station (Station #1)

5.2. MAPPING RULES FOR VALVE STATIONS ≤ 12

- ► If 12 < valve stations ≤ 24, special rules are required since only 1 solenoid number is allocated to valve station with single solenoid:</p>
- Sequence all solenoids following the rules below by starting from 1st station which is the station closest to control module:
 - o If 1st station is with double solenoids, sequence solenoid A as Sol.01, solenoid B as Sol.02, following 2nd station solenoid A as Sol.03, solenoid B as Sol.04.....
 - o If 1st station is with single solenoid, sequence solenoid A as Sol.01, following 2nd station solenoid A as Sol.02, solenoid B as Sol.03.....
 - o If a station is originally configured as blank, please make sure whether they are configured "single solenoid" or "double solenoid" and follow the rules above accordingly.
 - o The rest of stations should also adhere to the sequence rules above.
 - A 16-station 24 solenoids valve island example is shown below:

	Double Solenoids	Double Solenoids	Single Solenoid	Single Solenoid	Double Solenoids	Double Solenoids	Single Solenoid	Double Solenoids	Single Solenoid	Double Solenoids	Single Solenoid	Double Solenoids	Single Solenoid	Single Solenoid	Double Solenoids	Single Solenoid
Station	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14	#15	#16
Salanaid A	Sol.01	Sol.03	Sol.05	Sol.06	Sol.07	Sol.09	Sol.11	Sol.12	Sol.14	Sol.15	Sol.17	Sol.18	Sol.20	Sol.21	Sol.22	Sol.24
(14 Solenoid)	Output 0	Output 2	Output 4	Output 5	Output 6	Output 8	Output 10	Output 11	Output 13	Output 14	Output 16	Output 17	Output 19	Output 20	Output 21	Output 23
Solonoid P	Sol.02	Sol.04			Sol.08	Sol.10		Sol.13		Sol.16		Sol.19			Sol.23	
(12 Solenoid) Out	Output 1	Output 3	*	*	Output 7	Output 9	*	Output 12	*	Output 15	*	Output 18	*	*	Output 22	*

Note:

* For valve station with single solenoid, only Solenoid A (14 Solenoid) is allocated & connected.

Consider the one which is closest to control module as 1st station (Station #1).



6. Commissioning

Notes:

- 1. The method of module installation strongly depends on the configuration software. Please refer to the configuration software manual.
- 2. All examples in this document are made with following tools, Hardware: Schneider Electric PLC M421 TM241CEC24U. Software (Schneider Electric): SoMachine V4.3.

6.1. Prepare

Open the Software to choose a recent project or create a new project or open an existing project.

6.1.1. Create a Project

• Click New Project, then Assistant and then the controller you are using

	SoMachine Central - V4.3		- (B) ×
	uilter Vino Designer SolMachine Basic Maintenance • Tools •		Þ
			Help Center 🔻
Get started			
Start > New Project > Assistant >			
Recei Assis New Project Assistant			1
Conn With General Properties Matching T	emplates		
New Empt Project Name:	Controllers		
Oper New Untilled	Type	Version	Details
Start with:	TM241C24T/U	4.0.6.42	1
1 Controller *	TM241C40R	4.0.6.42	a la
Requirements	TND41C40TAL	40.6.42	
Field bus is needed	TWOATCE24R	40642	ă III
Motion control is needed	TW241CE24TAL	40642	a -
Program Language:	TM241CE40P	40.5.42	
Continuous Function Chart (CFC) +	THEATCHAIL	406.42	
	TRANSCOLD	406.42	
	TH24/06/24TA1	406.42	
3	N251		
, i i i	TM251MESC	4.0.6.18	i
	TM251MESE	4.0.6.18	ĩ
	M258		
	TM258LD42DT	4.0.3.6	i
	TM258LD42DT4L	4.0.3.6	i
	TM258LF42DR	4.0.3.6	i
	TM258LF42DT	4.0.3.6	i
	TM2501 FA2DITAL	4036	
		4	Create Project
			Schneider

6.1.2. Install EDS File

A device description file is needed for configuration of valve island. The Electronic Data Sheet (EDS) file is provided by Norgren and can be downloaded from the following web link:

• https://www.norgren.com/uk/en/technical-support/software

The EDS (Electronic Data Sheet) file has different variants for 12V and 24V variants:

- NORGREN-VR1X-12V-CANOPEN-VX.X-YYYYMMDD.eds
- NORGREN-VR1X-24V-CANOPEN-VX.X-YYYYMMDD.eds

Note: "X.X" is software version; "YYYYMMDD" (YYYY-year, MM-month, DD-day) is date of release.



The EDS file can be installed inside the engineering tool by the following steps in SoMachine V4.3.

Open Configuration of the project

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Norpens VRTX CANOpen.project	
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Workflow Versions Properties	
Weatlow	Manaja Devices 2 Com Contgaration
	Schneider

Click "Tools" menu then click "Device Repository".

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- 🕼 DI (Digital Inputs)	Geo baloning and the			- Carlos Favorites
- 🙀 DQ (Digital Outputs)	Qustomze			
-LT Counters (Counters)	Optons			
- PLI Pulse_Generators (Pulse Generators)				
Cartridge_1 (Cartridge)				
IO_Bus (IO bus - TM3)				▼ Logic Controller
COM_Bus (COM Bus)				Name
Enemet_1 (Enemet Network)				Image: Image
Geldartina Natural Manager (Solla				III M238
E diff Serial Line 2 (Serial line)				III M241
Monthus Manager (Monthus Manager)				Image: Image
(CAN 1 (CANopen bus)				₩ 10 M258
				I Soft PLC
				W MM Controller
				Name
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				El VETOC Series
				B (F) VBTGK Series
				R. F. VBTGT Series
				Drive Controller
				 Motion Controller
				Name
				I LMC xx8
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< >				🗟 💮 Soft PLC
Use DTM Connection				
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			Last build: O 0 • 0 Precomple:	



• Click the "Install" button in dialog box then change the file type to "EDS and DCF files" and open the eds file we used.



After the successful installation the device is listed in the tree "Fieldbuses \rightarrow CANopen \rightarrow Remote Device".



6.2. Hardware Configuration

Note: please create a new project or open an existing project before configuring any hardware.

6.2.1 Add Device Application

Right click the "CAN_1 (CANopen bus)" listed in the Device tree, then click the item "Add Device".





• 4 X

ager (SoMi

= 👘 Norgren VR 1X CANOpen

MyController (TM241CEC24T/U) DI (Digital Inputs) 🙀 DQ (Digital Outputs) Counters (Counters) Pulse Generators (Pulse Generators) Cartridge_1 (Cartridge) IO_Bus (IO bus - TM3) COM_Bus (COM bus) Ethernet_1 (Ethernet Network) 🗧 🛷 Serial_Line_1 (Serial line) SoMachine_Network_Ma

Serial_Line_2 (Serial line)

•

Our policy is one of continued research and development. We therefore reserve the right to amend, without notice, the specifications given in this document. © 2023 Norgren



• After the successful addition the new device "CANopen Performance" will be listed in the Device tree.



• Right click the "CANopen_Performance" and click "Add Device". Select "Norgren" in Vendor list, then click device "VR1X CANopen" and click "Add Device" button.





6.2.2. Configure CANopen node-id and bit rate

VR10/VR15 supports setting the bit rate by static (switches), object dictionary (SDO), autodetect or LSS methods. VR10/15 supports setting of the node-id by static (switches), object dictionary (SDO) or LSS methods. When setting node-id and bit rate the device should be reset for the new settings to take effect. See section 9 for further information.

- Remove the window to set the rotary switch with a 2mm slotted screwdriver during power off.
- Refer to standard CiA 305 v3.0.0 for LSS details

The detailed functions of the switches are shown as below:



Bit rate setting SW3

Bit rate switch value	Function
0	Set bit rate by object dictionary (SDO) or LSS
1	1000kbps
2	800kpbs
3	500kpbs
4	250kpbs
5	125kbps
6	50kbps
7	20kpbs
8	10kbps
9	AUTOBAUD

Node-ID setting rangeSW2 and SW1

Node-ID switches value	Function
00	Set node-ID by object dictionary (SDO) or LSS
1 - 99	Node-ID

 Double click "CAN_1(CANopen bus)" in Devices tree, then select the "Baudrate(bits/s)" as dial panels setting and deselect "Block SDO, DTM and access while application is running".

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				0
- 25			Favorites	
Morgren VR IX CANOpen	Baudrate (xits/s): 25000 CRNOCCO		Name	
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DO (Digital Dutouts)				
-LT Counters (Counters)	Unite bio Access			
- TL: Pulse_Generators (Pulse Generators)				
Gartridge_1 (Cartridge)				
10_Bus (IO bus - TM3)	3		Logic Controller	
COM_Bus (COM bus)			Name	
Ethernet_1 (Ethernet Network)			₩- 1 M221	
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😑 📆 CAN_1 (CANopen bus)	 1		₩ <u>₩</u> M258	
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6.2.3. Configure CANopen Performance - Heartbeat

• Double click "CANopen_Performance" in Devices tree, then select the "Enable Heartbeat Producing" and set the "Node ID" as 0. The "Producer Time(ms)" should be setting no longer than 2000.

		(– (6) ×
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0	CANopen Manager CANopen I/O Mapping Information	
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DI (Dialtal Inouts)		- 🗀 Pavorites
- 🙀 DQ (Digital Outputs)	V Autostat CANoperManager V Poling of optional slaves	
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- 🗊 Cartridge_1 (Cartridge)	Sync	
10_8us (10 bus - TM3)	Enable Sync Producing	Logic Controller
COM_Bus (COM bus)	C08-ID (Hex): 16# 80 0	Name
Ethernet_1 (Ethernet Network)	Cycle Period (jus): 50000 0	₩- 1 M221
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6.2.4. Configure Slave Device

Double click "VR1X_CANopen" in Devices tree, set the "Node ID" as dial panels setting on Module, select "Enable Expert Settings", "Create all SDOs", "Optional Device" and "Enable Emergency".

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- Ancoren VR UK CANGoren	General	2		▼ Favorites
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Ethernet 1 (Ethernet Network)	Guard Time (ms): 0	Producer time (ms): 1000		Name
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SoMachine_Network_Manager (SoM				M238
B 🕼 Serial_Line_2 (Serial line)	Emergency	TIME		R. @ M251
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6.3. Digital Outputs Data

In EDS file, the digital outputs data is defined as "RPDO" and "SDOs Index: 0x2000, Subindex: 0x01~0x03". - VR10 / VR15 valve island channel outputs will be real-time monitored & displayed.

- Channel outputs process codes will be reported by "Output Byte0", "Output Byte1" and "Output Byte2".
- The digital outputs data can be found as following capture.
 - o Double click "VR1X_CANopen".
 - o Select "CANopen I/O Mapping".
 - o Expand "Variable".

ces tree	• • × /@ NyCont	ler / 🛛 VR1X_CANo;	en 🗙 🗿 🗛	iopen_Perform	ance	CAN_1						Controller	• 3
	CANopen Remot	Device PDO Mapping Rec	eive PDO Mapping	Send PDO Map	ping Servi	ce Data Object CANopen C	Configuration CANope	I/O Mapping Status Inform	ation				
Alexandra 10 17 CM/Door	Channels											▼ Favorites	
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C (Detai Detair)	- 10		Output Bytell	%Q03.0	800L	FALSE							
-ID Counters (Counters)	-10		Output Dyte0	%Q03.1	BOOL	FALSE		'n					
T i Puise Generators (Puise Gen	oerators)		Ostput Byteb	%Q03.2	BOOL	FALSE		2					
(iii Certridoe 1 (Certridoe)	- •		Output Bytell	%Q/3.3	800L	FALSE							
10 Bus (10 bus - TH3)	-*•		Output Byte®	%Q03.4	BOOL	FALSE							
COM_Bus (COM bus)	- •		Output Dyte0	%00.5	BOOL	PALSE						* Logic Controller	
Ethernet_1 (Ethernet Netwo	xk) (kr		Output Byteb	%Q03.6	800L	FALSE						Name	
R @ Serial_Line_1 (Serial line)			Output Bytell	%Q/3.7	800L	FALSE						8- 🗐 M221	
SoMachine_Network_Ma	mager (SoMa		Output Byte1	%Q84	USINT							* (g) M238	
■ 4₽ Serial_Line_2 (Serial line)	2		Ostput Byte1	16004.0	BOOL	FALSE						#-18 M241	
Modbus_Nanager (Nod)	bus Manager)		Output Byte1	%Q004.1	800L	FALSE						#- @ M251	
- 🗊 CAN_1 (CANopen bus)			Output Byte1	%Q04.2	BOOL	FALSE						* <u>10</u> M258	
E GANopen_Performance	(CANopen Pe		Output Byte1	%Q04.3	BOOL	FALSE						* B SOTFIC	
WRIX_CANopen (VR	LEX CANopen)		Ostput Byte1	%Q04.4	BOOL	FALSE							
	2		Output Byte1	%Q04.5	800L	FALSE							
			Output Bytes	76(04.5	BOOL	PALSE							
			Output Bytel	NULL N	BOOL	PALSE							
			Output Byte2	19400	000M	544.00							
			Output Bytez	100000	BOOL	PHLOC RAL CE							
			Output Dytez	N COLE 2	8000	EALER							
			Output Dyte2	8,005.2	8000	EALCE							
			Output Byte2	100/03	8000	EALSE							
	× -		Output Bytez	10000	BOOL	PALSE RALES							
			Outruit Byte2	\$605.6	8001	FALSE							
			Output Byte2	\$605.7	8001	FALSE							
			Output Byte2	%Q/6.7	800L	FALSE							
	IEC Objects									Reset mapping	Always update variables		
	Variable	Mapping	Type										
	- @ VRIX	ANcore No.	CANRemoteDev	ice .								HPE Controller	
	3 - 4 460		Contractionere									Drive Controller	
ITM Connection												Motion Controller	

Outputs Value and solenoid number mapping relationships are shown in table below.

- The bit is "TRUE" means the output is active on that solenoid.
- The bit is "FALSE" means no output.
- Outputs positioning to valve station follow the mapping rules stated in Chapter 5.

Output Byte0								
Solenoid	Sol.08	Sol.07	Sol.06	Sol.05	Sol.04	Sol.03	Sol.02	Sol.01
Bit	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit O
Value	FALSE/TRUE							
Output Byte1								
Solenoid	Sol.16	Sol.15	Sol.14	Sol.13	Sol.12	Sol.11	Sol.10	Sol.09
Bit	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit O
Value	FALSE/TRUE							
Output Byte2								
Solenoid	Sol.24	Sol.23	Sol.22	Sol.21	Sol.20	Sol.19	Sol.18	Sol.17
Bit	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit O
Value	FALSE/TRUE							



6.4. Diagnostics

In EDS file, the diagnostics data is defined as "Emergency" and "SDOs Index: 0x2004, Subindex: 0x01~0x0A". For the format of the Emergency message (EMCY) see CiA3.01 v4.20.

Note that all SDO read messages have a DLC (data length code) of 8 and all unused bytes are padded with zeroes.

The diagnostics data reflect diagnostic status, it includes four parts:

1) Overall status diagnostics

2) Short circuit diagnostics per solenoid

3) Open load diagnostics per solenoid (e.g., wire break of solenoid)

4) Cycle overrun diagnostics per solenoid (cycles beyond the count limit)

The diagnostics data can be found as following capture.

• Double click "VR1X_CANopen".

- Select "Status".
- Set "Service data object (SDO)" and click "Read SDO".



Index	Subindex	EDS name									
	001	Overall Status Diag-	Fault type	-	OC	SC	COR	UV-VB	OV-VB	UV-VA	OV-VA
	UXUT	nostics	Bit	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit O
	0.02	Short Circuit Diagno-	Solenoid	Sol.08	Sol.07	Sol.06	Sol.05	Sol.04	Sol.03	Sol.02	Sol.01
	0x02	stics Byte0	Bit	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	0.02	Short Circuit Diagno-	Solenoid	Sol.16	Sol.15	Sol.14	Sol.13	Sol.12	Sol.11	Sol.10	Sol.09
	0x05	stics Byte1	Bit	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	0.004	Short Circuit Diagno-	Solenoid	Sol.24	Sol.23	Sol.22	Sol.21	Sol.20	Sol.19	Sol.18	Sol.17
	0x04	stics Byte2	Bit	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	0,05	Open Load Diagno-	Solenoid	Sol.08	Sol.07	Sol.06	Sol.05	Sol.04	Sol.03	Sol.02	Sol.01
0,2004	0,03	stics Byte0	Bit	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0,2004	0x06	Open Load Diagno-	Solenoid	Sol.16	Sol.15	Sol.14	Sol.13	Sol.12	Sol.11	Sol.10	Sol.09
		stics Byte1	Bit	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit O
	0.07	Open Load Diagno-	Solenoid	Sol.24	Sol.23	Sol.22	Sol.21	Sol.20	Sol.19	Sol.18	Sol.17
	0,07	stics Byte2	Bit	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit O
	0,00	Cycle Overrun Diag-	Solenoid	Sol.08	Sol.07	Sol.06	Sol.05	Sol.04	Sol.03	Sol.02	Sol.01
	0,000	nostics Byte0	Bit	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit O
	0,00	Cycle Overrun Diagno-	Solenoid	Sol.16	Sol.15	Sol.14	Sol.13	Sol.12	Sol.11	Sol.10	Sol.09
	0.07	stics Byte1	Bit	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit O
	0×0α	Cycle Overrun Diagno-	Solenoid	Sol.24	Sol.23	Sol.22	Sol.21	Sol.20	Sol.19	Sol.18	Sol.17
	0,00	stics Byte2	Bit	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit O



6.4.1. Overall Status Diagnostics 0x2004 subindex 0x1

The overall status diagnostic includes:

- Over voltage diagnostics for valve power OV-VA
- Under voltage diagnostics for valve power UV-VA
- Over voltage diagnostics for electronic power OV-VB
- Under voltage diagnostics for electronic power UV-VB
- Cycle overrun overall diagnostics (cycles beyond the count limit) COR
- Short circuit overall diagnostics SC
- Open load overall diagnostics (e.g. wire break of solenoid) OC

Binary value and fault type mapping relationships are shown in table below. 0 is no fault, 1 is fault found.

SDOs Index:0x2004, Subindex:0x01								
Fault type	-	OC	SC	COR	UV-VB	OV-VB	UV-VA	OV-VA
Bit	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit O
Value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1

Common fault errors are shown below:

LED	Status	Descriptions
	Green on	Voltage OK
VA (Valve Power Supply)	Flashing red	Under voltage UV-VA
	Red	Over voltage OV-VA
	Green on	Voltage OK
VB (Electronics Power Supply)	Flashing red	Under voltage UV-VB
	Red	Over voltage OV-VB

See Section 7 for detailed LED description.



6.4.2. Short Circuit Diagnostics 0x2004 subindex 0x02, 0x03, 0x04

Binary value and solenoid mapping relationships are shown in table below. O is no fault, 1 is fault found. An EMCY message is generated with error code 0x2000 current error.

SDOs Index:0x200	SDOs Index:0x2004, Subindex:0x02										
Solenoid	Sol.08	Sol.07	Sol.06	Sol.05	Sol.04	Sol.03	Sol.02	Sol.01			
Bit	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit O			
Value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1			
SDOs Index:0x200	SDOs Index:0x2004, Subindex:0x03										
Solenoid	Sol.16	Sol.15	Sol.14	Sol.13	Sol.12	Sol.11	Sol.10	Sol.09			
Bit	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit O			
Value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1			
SDOs Index:0x200	4, Subindex:0x04										
Solenoid	Sol.24	Sol.23	Sol.22	Sol.21	Sol.20	Sol.19	Sol.18	Sol.17			
Bit	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0			
Value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1			

6.4.3. Open Load Diagnostics 0x2004 subindex 0x05, 0x06, 0x07

Binary value and solenoid mapping relationships are shown in table below. O is no fault, 1 is fault found. An EMCY message is generated with error code 0x1000 generic error.

SDOs Index:0x2004, Subindex:0x05									
Solenoid	Sol.08	Sol.07	Sol.06	Sol.05	Sol.04	Sol.03	Sol.02	Sol.01	
Bit	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit O	
Value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	
SDOs Index:0x2004, Subindex:0x06									
Solenoid	Sol.16	Sol.15	Sol.14	Sol.13	Sol.12	Sol.11	Sol.10	Sol.09	
Bit	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit O	
Value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	
SDOs Index:0x2004, Subindex:0x07									
Solenoid	Sol.24	Sol.23	Sol.22	Sol.21	Sol.20	Sol.19	Sol.18	Sol.17	
Bit	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	
Value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	

6.4.4. Cycle Overrun Diagnostics 0x2004 subindex 0x08, 0x09, 0x0A

Binary value and solenoid mapping relationships are shown in table below. O is no fault, 1 is fault found. AN EMCY message is generated with error code 0x1000 generic error.

Note: Need to set valid count limit so that this diagnostic function is effective.

SDOs Index:0x2004, Subindex:0x08									
Solenoid	Sol.08	Sol.07	Sol.06	Sol.05	Sol.04	Sol.03	Sol.02	Sol.01	
Bit	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit O	
Value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	
SDOs Index:0x2004, Subindex:0x09									
Solenoid	Sol.16	Sol.15	Sol.14	Sol.13	Sol.12	Sol.11	Sol.10	Sol.09	
Bit	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit O	
Value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	
SDOs Index:0x200	4, Subindex:0x0A								
Solenoid	Sol.24	Sol.23	Sol.22	Sol.21	Sol.20	Sol.19	Sol.18	Sol.17	
Bit	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit O	
Value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	



6.4.5 Emergency (EMCY) messages

See CiA3.01 v4.20 for the EMCY protocol. The Norgren specific parts of the message (bytes 3-7) are detailed below.

Byte 0~Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Error code	Error register	Status bits	Module NO.	Channel NO.	Error NO.	Additional error info

The codes that Norgren uses are as follows:

		0x0000	Error rese	t or no) error		
Dida Dida1	Causa es de	0x1000	Generic E	rror			
Byte0~Byte1	Error code	0x2000	Current E	rror			
		0x3000	Voltage E	rror			
		BitO	generic ei	ror			
		Bit1	current				
		Bit2	voltage				
Duta 2	E	Bit3	temperat	ure			
Bytez	Error register	Bit4	communi	catior	n error (overrun, error state)		
		Bit5	device pro	ofile s	pecific		
		Bit6	Reserved	(alwo	iys 0)		
		Bit7	manufact	turer s	specific		
		BitO	Error at V	/alve			
		Bit1	Error at D	Digital			
		Bit2	Error at A	nalog	Jue		
Duta 2	Charters hits	Bit3	Error at F	uncti	on		
Bytes	Status bits	Bit4	Undervolt	tage/(Overvoltage		
		Bit5	Short circ	:uit/O	verload		
		Bit6	Wire bred	ık			
		Bit7	Other err	or			
Byte4	Module NO.	Node-id					
Byte5	Channel NO.	channel which error a gency message, OxFF	opeared/dis for module	sappe e mer	ared (only available for channel emer- gency message).		
			0x01	Syst	em/Sensor Power Under Voltage.		
			0x02	Syst	System/Sensor Power Over Voltage.		
			0x03	Out	put/Valve Power Under Voltage.		
		Module Emergency	0x04	Out	put/Valve Power Over Voltage.		
			0x05	Parc	imeters Error.		
			0x06	Add	ress Conflict.		
			0x07~0x	7F Res	served		
Durba 6	Error NO		0x80		Reserved.		
Byteo	LITOI NO.		0x81-0>	(82	Not Available For This Product.		
			0x83		Channel Valve/Digital Output Short Circuit.		
		Channel Emergenau	0x84		Channel Valve/Digital Output Open Load.		
		Channel Emergency	0x85- 0x	88	Not Available For This Product.		
			0x89		Channel Valve Cycle Overrun.		
			0x8A~0x	FE	Reserved		
			OxFF		Reserved		
Byte7	Additional error info	Reserved , 0xFF.					

Below is an example of a cycle overrun EMCY message.

Byte #	Name	Value	Meaning
0,1	Error code	0x1000	Generic Error
2	Error register	0x11	Generic error + communication error (overrun, error state)
3	Status bits	0x82	Error at digital + Other error
4	Module No.	OxOc	Device address 12
5	Channel No.	0x00	Sol. 1 (value 0~23 corresponding Sol.1~24)
6	Error No.	0x89	Channel valve cycle overrun
7	Additional error info	Oxff	reserved



6.5. Parameterization

All the parameterization data must be downloaded after setting.

6.5.1. Cycle Counter Limit 0x2002 subindex 0x01 - 0x18

It is possible for VR10 / VR15 valve island to set cycle counter limit for each solenoid. When the cycle count limit is reached an EMCY message, with error code 0x1000 generic error, is generated.

- Double click "VR1X_CANopen".
- Select "Service data object".
- Set the counter limit value for each solenoid. The default value for each solenoid is 4294967295, the maximum limit value.



- Variable name and solenoid number mapping relation is shown in table below.
- The range of counter limit for each solenoid between 0 and 4294967295.
- Solenoid number and output point mapping relationships are shown in Chapter 5.

Cycle Count Limit Mapping, SDO index 0x2002, for solenoids x (x=1 to 24)							
Variable Name	Solenoid	Subindex	Value Range				
Output(x-1) cycle counter limit	Sol. x	х	0~4294967295				



6.5.2 Open Load Diagnostics Setting 0x2005 subindex 0x01 – 0x18

It is possible for VR10 / VR15 valve island to enable / disable the open load diagnostics for each solenoid. If disabled, no open load diagnostic error appears.

- Double click "VR1X_CANopen".
- Select "Service data object".
- Set "0" or "1" for each solenoid to enable or disable open load diagnostics function. The default value for each solenoid is "0", it means open load diagnostic is disabled as default.

es tree	* 0 X		open_Performance	VR1X_CAllopen x	MyController	CAN_1		- 2					▼ Controller	• 0
	C,	CANopen Ren	note Device PDO Map	ping Receive PDO Mapping Send P	DO Mapping S	ervice Data Object	CANopen Config	ration CANopen I/O Ma	pping Status	Information				
Norgren VR LX CANOpen	•	Line	Index:Subindex	Name	Value	Bitlength	Abort if error	Jump to line if er	Next line	Comment		^	Favorites	
MyController (TM2	41CEC24T/U)	- 58	16#2003:16#14	Output 19 Cycle Counter Reset	0	8			0				- Co Favoritar	
DI (Digital Inputs)		- 59	16#2003:16#15	Output20 Cycle Counter Reset	0	8			0				_ rerented	
N DQ (Digital Output	B)	- 60	16#2003:16#16	Output21 Cycle Counter Reset	0	8			0					
-LT Counters (Counter	rs)	- 61	16#2003:16#17	Output22 Cycle Counter Reset	0	8			0					
-TU Pulse_Generators	(Pulse Generators)	- 62	16#2003:16#18	Output23 Cycle Counter Reset	0	8			0					
Cartridge_1 (Cart	ridge)	- 63	16#2005:16#01	Output® OpenLoad Diagnostics	0	8			0					
10_Bus (10 bus - 1	TM3)	- 64	16#2005:16#02	Output1 OpenLoad Diagnostics	0	8			0				▼ Logic Controller	_
COM_Bus (COM b	us)	- 65	16#2005:16#03	Output2 OpenLoad Diagnostics	0	8			0				Name	
Ethernet_1 (Ether	met Network)	- 66	16#2005:16#04	Output3 OpenLoad Diagnostics	0	8			0				₩-101 N221	
Serial_Line_1 (Ser	ial line)	- 67	16#2005:16#05	Output4 OpenLoad Diagnostics	0	8	1 ñ	ñ	0				#- @ M238	
SoMachine_N	etwork_Manager (SoMa	- 68	16#2005:16#06	Output5 OpenLoad Diagnostics	0	8	1 1		0				# 69 M241	
4 Serial_Line_2 (Ser	ial line)	- 69	16#2005:16#07	Output6 OpenLoad Diagnostics	0	8			0				# # M251	
Modbus_Mana	ager (Modbus Manager)	- 70	16#2005:16#08	Output7 OpenLoad Disconstics	0	8			0					
CAN_1 (CANopen	bus)	- 71	16#2005:16#09	Output® OpenLoad Disconstics	0				0					
E 👔 CANopen_Per	formance (CANopen Pe	- 72	16#2005:16#04	Output9 OpenLoad Disconstics	0				0				an in an tree	
VRIX_CA	Nopen (VR.1X CANopen)	-73	16#2005:16#08	Output 10 Open Load Diagnostics	0				0					
		- 74	16#2005:16#00	Output 11 Open Load Diagnostics	0				0					
		- 75	16#2005:16#00	Output 12 Open Load Diagnostics	0				0					
		76	16#2005:16#0E	Output 13 Open Load Diagnostics	0				0					
	N N	- 77	16#2005-16#0E	Output 14 Open Load Diagnostics	0				0					
	1		16#2005.16#10	Ordersh1E Open Land Disperantice	0				0					
		70	1002000.10010	Output 15 Open Losd Disgnostics	0				0					
		- /7	1002000.10011	Output to Open Load Disgnostics	0				0					
			16+2003/16+12	Output 17 Open Load Diagnostics	0				0					
		- 01	16+2005-16+14	Output 19 Open Load Diagnostics			1 8		0					
		82	10+2000116#14	Output 19 Open Load Diagnostics	0	•			0					
		a3 41	10+2000:10+15	Output20 Open Load Draghostics	0	•			0					
		- 89	10+2000116#16	Output21 Open Load Diagnostics	0	0	1 8 -		0					
		- 85	10#2000:16#17	output22 open coad Diagnostics	0	0	1 8		0					
		- 35	10#200010#18	output25 open Load Diagnostics	0	•			0					
		- 87	16#2006:16#01	outputu raii sare State	0	•			0					
		- 88	16#2006:16#02	output 1 rail Sare State		4			0					
		- 89	16#2006:16#03	Outputz Fail Sare State	0	8			0					
		- 90	16#2006:16#04	output3 Fail Safe State	Ų	8			U					
		- 91	16#2006:16#05	Output4 Fail Safe State	0	8			0			~	HMI Controller	_
	>	Move	e up Movel	down							New	Delete Edit	Drive Controller	
OTM Connection													Motion Controller	
C.W.		SDO Timeo	ut (ms): 1000	÷										

- Value and solenoid number mapping relationships are shown in table below.

- The bit that is set to "1" means enable open load diagnostics function of that solenoid.
- The bit that is set to "0" means disable open load diagnostics function of that solenoid.
- Solenoid number and output point mapping relationships are shown in Chapter 5.

Open Load Diagnostics Setting, SDO index 0x2005, for solenoids x (x=1 to 24)							
Variable Name	Solenoid	Subindex	Value Range				
Output(x-1) open load diagnostics	Sol. x	х	0/1				



6.5.3. Failsafe State Setting 0x2006 subindex 0x01 – 0x18

It is possible to define the behaviour of the outputs in case of broken CANopen communication or PLC stopped. Failsafe settings are set 3 seconds after the last communication from the PLC is received. See section 6.2.3.

- Double click "VR1X_CANopen".
- Select "Service data object".
- Set "0" or "1" for each solenoid to define the behaviour of the outputs in case of broken CANopen communication or PLC stopped. The default value for each solenoid is "0", it means no output of that solenoid in case of broken CANopen communication or PLC stopped as default.

Be (are yeer, basic (back (back)) Description (back (back)) Description (back (back)) Description (back (back)) Description (back (back)) Description (back (back)) Description (back (back)) Description (back (back)) Description (back (back)) Description (back (back)) Description (back (back)) Description (back (back)) Description (back (back)) Description (back (back)) Description (back (back)) Description (back (back)) Description (back (back)) Description (back)) Description (back) Description (back)) <	Tennoler
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Contract Viax Contract Viax Contract Con	Controller Favorites Name Controller ILogo Controller Name Mane Mane
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Original Status Offsteen Levels Sense ICO Magers Sense ICO Magers <td>Favorites Name Favorites Favorites</td>	Favorites Name Favorites Favorites
Image: Proceeding of the Control of the Con	r Favorites Name - ⊇ Favorites r Logo Controller Name - ⊇ # ∰ H221 # ∰ H228
Image: Mark (CARGM) Use Value Republic (Mark (Name
Implementation 1542005015473 Operation Dynamic Constraints 0 0 0 Implementation 1542005015473 Operation Dynamic Constraints 0 0 0 0 Implementation 1542005015473 Operation Dynamic Constraints 0 0 0 0 0 Implementation 154205015473 Operation Dynamic Constraints 0	
Bit P. Digital Should) L2 148/005-15444 Output Departed Department is in a line Image: Control Should Department is line	Logic Controller Name A
Q Copia Open B / 2005/16475 Owen/D Open-tac/D Open-ta	FLogic Controller Name → ∰ M221 → ∰ M238
-1: Doubling (countrie) -4: #1474003:1474.0 Operation (Countrie) 0 - 0 11: Doubling (countrie)	Logic Controller Name I III N221 I III N238
O Date_Scienceshow 65 6 Control 65 6	Name Numer Name Name M211 M238
Controls_1_(centrols) 1/4 (2620):1611 Output Operation 0 1 0 Controls_1_000:1611 Output Operation 1612 State 0 0 0 0	Logic Controller Name M221 M238
12: 10 [0x (10 hos - PM3) - 87 15#22001:15#51 Output0 Fail Safe State 0 8 0 v	Logic Controller Name M221 M238
	Name #-111 M221 #-111 M238
B 16#200516#12 Output FailSafe State 0 8 0 0	н 🗑 M221 н 🗑 M238
Emernet_1_regreenetsreewowy	₩- ∰ M238
■ ♥ Schil_Ine] [Schilline] -10 15#2005:15#04 Output3 Fail Safe State 0 8 0 0	1.2
B Soldachine Jvetwork Manager (Solda) 91 154/2005:154/05 Output/4 Fail Safe State 0 8 0	H M241
P Send Inc. Z Danaline) -92 16#2005:16#06 Output5 Fail Sefe State 0 8 0 0	# m251
Image: Image:<	⊛ m № №258
■ (CAV) (CANopenbus) 94 16#2001:16#08 Output7 FeilSefe Rate 0 8 0 0	B- m Soft PLC
CMaper Performance (CMaper Per 95 16#2206:16#09 Output8 Fail Safe State 0 8	-
WR.UC_CAllopen (MR.UC_Allopen) 96 16#2006:16#0A Output9 Fail Safe Bate 0 8 0	
97 16#2006:15#08 Output:10 Fail Safe State 0 8 0 0	
98 15#2005:15#0C Output:1 Fail Safe State 0 8 0 0	
99 15#2005:15#0D Output:12 Fail Safe State 0 8 0 0	
100 16#2005:15#9E Output:13 Fail Safe State 0 8 0 0	
101 16#2005:15#0F Output:14 Fall Safe State 0 8 0 0	
102 16#2004:16#10 Output19 Pel Safe State 0 0 0 0 0 0	
103 16#2200:16#11 Output19 Fol Safe State 0 8 0 0	
104 16#2005:16#12 Output:7 Fall Safe State 0 8 0	
105 16#2005:16#13 Output:18 Fail Safe State 0 8 0	
106 16#2005:15#14 Output19 Fail Safe 0 8 0	
107 15472051:15415 Output20 Fail Safe 0 8 0 0	
108 16#2005:16#15 Output21 Fail Safe State 0 8 0	
- 109 164/2005:164/37 Output22 Fail Safe State 0 8 0 0 0	
- 110 164/2005116418 Output23 Fel Safe Stete 0 8 0 0 0	
-111 16#2101:16#00 Node Id 0 6 0	
112 16#2101:16#91 Automatic Detection 0 8 0 0	
113 16#2101116#92 Binnte 0 8 0	
A Design	HMI CONTOILE
Vice Control C	Unive Controller
SDO Timeout (m): 1000 0	Motion Controller
The Devices the 🔯 Applications the 📶 Tools the	🗄 Co 📮 Device 🗗 H
Messages - Totally 0 eror(s), 1 warming(s), 9 message(s)	
Last buld: 🔾 0 😗 1 🛛 Frecomple: 🗸 🖸	Iurrent user: (nobody)

- Value and solenoid number mapping relationships are shown in table below.
- The bit that is set to "1" means last valid value of that solenoid is retained in case of broken CANopen communication or PLC stopped.
- The bit that is set to "O" means no output of that solenoid in case of broken CANopen communication or PLC stopped.
- Solenoid number and output point mapping relationships are shown in Chapter 5.

Fail Safe State Setting, SDO index 0x2006, for solenoids x (x=1 to 24)								
Variable Name	Solenoid	Subindex	Value Range					
Output(x-1) Fail Safe State Setting	Sol. x	x	0/1					

6.5.4. Voltage and Short Circuit Diagnostics Setting

VR10 / VR15 valve island supports voltage diagnostics for both electronic power and valve power and short circuit diagnostics for each solenoid. These two diagnostic functions cannot be disabled.

• In case of over / under voltage the related LEDs on the valve island change colour from green to red.

See section 6.4, 6.4.1 and 7.



6.6. Cycle Counting Data Acquisition 0x2001 Subindex 0x01 – 0x18

VR10 / VR15 valve island supports cycle counting for each solenoid.

The following steps give a brief instruction to get data from VR10/VR15.

- Click the "Online" page and click the "Login" item.



- Click the "Debug" menu and click "Start" to run the PLC.
- Double click "VR1X_CANopen", and select "CANopen I/O Mapping" page.
- Double click the cell in column "Prepared Value" to switch the value of outputs.





- Click the "Debug" menu and click "Write values" to enable the prepared value.





- Select "Status" and set "Service data object(SDO)".
- Click "Read SDO" to show the value in "Result".

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- Variable name and solenoid number mapping relation is shown in table below.
- Solenoid number and output point mapping relationships are shown in Chapter 5.

Output Switching Cycles, SDO index 0x2001, for solenoids x (x=1 to 24)							
Variable Name	Solenoid	Subindex	Value Range				
Output(x-1) Output Switching Cycles	Sol. x	х	0~4294967295				



6.7. Cycle Counter Resetting 0x2003 subindex 0x01 - 0x18

VR10 / VR15 valve island supports cycle counter reset for each solenoid.

The following steps give a brief instruction to reset cycle counter data of VR10/VR15.

- Click the "Online" page and click the "Login" item.



- Click the "Debug" menu and click "Start" to run the PLC.
- Double click "VR1X_CANopen", and select "Status" page.
- Click "Enter Preoperational".
- Set "Service data object(SDO)".
- Click "Write SDO" and check "Result" is "Write ok".
- Click "Start Node".

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Value and solenoid number mapping relationships are shown in table below.

- Value and solenoid number mapping relationships are shown in the table below.
- The bit that is set to "1" means to clear & reset cycle counting value of that solenoid.
- The bit that is set to "O" means no action of clear & reset.

Solenoid number and output point mapping relationships are shown in Chapter 5.

Output Cycle Counter Reset, SDO index 0x2003, for solenoids x (x=1 to 24)			
Variable Name	Solenoid	Subindex	Value Range
Output(x-1) Output Cycle Counter Reset	Sol. x	x	0~4294967295



7. LED Status Description



ERROR LED(RED)	LED Status	Description	
Off	No error	The device is in working condition	
Single flash	Warning limit reached	At least one of the error counters of the CAN controller has reached or exceeded the warning level (too many error frames)	
Double flash	Error control event	A guard event (NMT-slave or NMT-master) or a heartbeat event (heartbeat consumer) has occurred	
Off	No error	The device is in working condition	
RUN LED(GREEN)	LED Status	Description	
Flickering	AutoBitrate/LSS	The auto-bit rate detection is in progress or LSS services are in progress (alternately flickering with error LED)	
Blinking	PRE-OPERATIONAL	The device is in state PRE-OPERATIONAL	
Single flash	STOPPED	The device is in state STOPPED	
On	OPERATIONAL	The device is in state OPERATIONAL	
PWR LED	LED Status	Description	
	Green on	Voltage OK	
VA (Valve Power Supply)	Flashing red	Undervoltage	
(valver over ooppi))	Red	Overvoltage	
	Green on	Voltage OK	
VB (Electronics Power Supply)	Flashing red	Undervoltage	
(2.000.0	Red	Overvoltage	



8. Object Dictionary Summary

Index	SubIndex	EDS name	Datatype	Access	Default Value
0x1000	0x00	Device Type	UNSIGNED32	ro	131473
0x1001	0x00	Error Register	UNSIGNED8	rw	0
0x1005	0x00	COB ID SYNC	UNSIGNED32	rw	128
0x1008	0x00	Manufacturer device name	VISIBLE_STRING	rw	VR1X CANopen
0x1009	0x00	Manufacturer hardware version	VISIBLE_STRING	rw	V0.1
0x100a	0x00	Manufacturer software version	VISIBLE_STRING	rw	V0.1
0x1014	0x00	COB ID EMCY	UNSIGNED32	rw	0
0x1017	0x00	Producer Heartbeat Time	UNSIGNED16	rw	1000
	0x00	Identity Object Number of entries	UNSIGNED8	ro	4
	0x01	Identity Object Vendor Id	UNSIGNED32	ro	0x76
0x1018	0x02	Identity Object Product Code	UNSIGNED32	rw	34336
	0x03	Identity Object Revision number	UNSIGNED32	rw	1
	0x04	Identity Object Serial number	UNSIGNED32	rw	0
	0x00	SDO server parameter Highest sub-index supported	UNSIGNED8	const	2
0x1200	0x01	SDO server parameter COB-ID client to server	UNSIGNED32	const	0
	0x02	SDO server parameter COB-ID server to client	UNSIGNED32	ro	0
	0x00	Receive PDO Communication Parameter Highest sub-index supported	UNSIGNED8	ro	2
0x1400	0x01	Receive PDO Communication Parameter COB ID	UNSIGNED32	rw	0
	0x02	Receive PDO Communication Parameter Transmission Type	UNSIGNED8	rw	254
	0x00	Receive PDO Mapping Parameter Highest sub-index supported	UNSIGNED8	rw	3
0x1600	0x01	Receive PDO Mapping Parameter Mapping Entry 1	UNSIGNED32	rw	536871176
	0x02	Receive PDO Mapping Parameter Mapping Entry 2	UNSIGNED32	rw	536871432
	0x03	Receive PDO Mapping Parameter Mapping Entry 3	UNSIGNED32	rw	536871688
	0x00	Output Highest sub-index supported	UNSIGNED8	ro	3
0_2000	0x01	Output ByteO	UNSIGNED8	rw	0
0,2000	0x02	Output Byte1	UNSIGNED8	rw	0
	0x03	Output Byte2	UNSIGNED8	rw	0
0x2001	0x00	Cycle Counter Highest sub-index supported	UNSIGNED8	ro	24
0,2001	0x01~0x18	Cycle Counter Output0~23 Switching Cycles	UNSIGNED32	ro	0
0x2002	0x00	Cycle Counter Limit Highest sub-index supported	UNSIGNED8	ro	24
	0x01~0x18	Cycle Counter Limit Output0~23 Cycle Counter Limit	UNSIGNED32	rw	OxFFFFFFF
0x2003	0x00	Cycle Counter Reset Highest sub-index supported	UNSIGNED8	ro	24
	0x01~0x18	Cycle Counter Reset Output0~23	BOOLEAN	rw	0
	0x00	Diagnostics Highest sub-index supported	UNSIGNED8	ro	10
	0x01	Diagnostics Overall Status Diagnostics	UNSIGNED8	ro	0
	0x02	Diagnostics Short Circuit Diagnostics Byte0	UNSIGNED8	ro	0
	0x03	Diagnostics Short Circuit Diagnostics Byte1	UNSIGNED8	ro	0
	0x04	Diagnostics Short Circuit Diagnostics Byte2	UNSIGNED8	ro	0
0x2004	0x05	Diagnostics Open Load Diagnostics Byte0	UNSIGNED8	ro	0
	0x06	Diagnostics Open Load Diagnostics Byte1	UNSIGNED8	ro	0
	0x07	Diagnostics Open Load Diagnostics Byte2	UNSIGNED8	ro	0
	0x08	Diagnostics Cycle Overrun Diagnostics Byte0	UNSIGNED8	ro	0
	0x09	Diagnostics Cycle Overrun Diagnostics Byte1	UNSIGNED8	ro	0
	0x0a	Diagnostics Cycle Overrun Diagnostics Byte2	UNSIGNED8	ro	0
0x2005	0x00	Open Load Diagnostics Highest sub-index supported	UNSIGNED8	ro	24
	0x01~0x18	Open Load Diagnostics Output0~23	BOOLEAN	rw	0
0x2006	0x00	Fail Safe State Highest sub-index supported	UNSIGNED8	ro	24
	0x01~0x18	Fail Safe State Output0~23	BOOLEAN	rw	0
0x2100 0x00 EEPROM node ID		EEPROM node ID	UNSIGNED8	rw	0
	0x00	Bit rate Highest sub-index supported	UNSIGNED8	rw	2
0x2101	Ux01	Autobaud enable	UNSIGNED8	rw	1
	0x02	Bitrate	UNSIGNED8	rw	3
	Ux00	Password Highest sub-index supported	UNSIGNED8	ro	2
0x2102	Ux01	Node ID Write enable	UNSIGNED32	rw	0
	0x02	Bit rate Write enable	UNSIGNED32	rw	0



9. Setting NODE-ID and BIT RATE - additional information

9.1. Overview

See section 6.2.2 for basic information and rotary switch information.

- The VR1X CANopen support three methods of setting the node-id and bit rate.
- Static uses the values set on the rotary switches
- SDO uses the values set in the object dictionary (0x2100, 0x2101) and requires a password (0x2102).

- LSS – layer setting service protocol. See CiA 305 Version 3.0.0.

The static method always takes priority.

NOTES:

1. Passwords:

Protected setting		Password			
Setting	Index	Subindex	Index	Subindex	Value to write
Node ID	0x2100	0x00		0x01	0x77774444
Bitrate	0x2101	0x02 0x2102	0x02	0x42424242	
Autobaud enable		0x01			

2. Rotary switch values are read at device start-up.

3. Node-ID or bitrate cannot be changed in software unless the relevant rotary switch is set to 0.

4. RUN/ERR LEDs will flash red/green to indicate the device is trying to establish the bit rate for connection (autobaud) OR that the device is in LSS mode.

5. The bit rate password must be written when changing 0x2101 01h (autobaud enable) OR 0x2101 02h (bit rate)

6. Changing bit rate via LSS will update the autobaud enable flag in 0x2101 01h

For more information see the flow charts in section 9.2 and 9.3.



9.2. Obtaining a node-id and bit rate

On start up the device will go through these steps to set a node-id and bit rate





9.3. Setting a node-id and bit rate

Once the device is PRE-OPERATIONAL, the following steps can be used to set the node-id and bit rate. The device must be reset for new settings to be applied. OD = object dictionary





10. RECYCLING INFORMATION

Device composition

Enclosures	PBT+ASA 20% GF
Overlay, labels	PET
PCB	Various, dispose of according to WEEE
Gaskets	Nitrile
Screws and connectors	Carbon steel / Stainless steel
Window	TR55 LX

Removing the circuit boards

- 1. Remove bus node from valve island
- 2. Remove top assembly from bottom assembly



- 3. Remove circuit board 1 from top assembly

4. Remove circuit board 2 from bottom assembly





11. Waste electrical and electronic equipment



Disposal of this product is regulated by the EU WEEE Directive for waste electrical and electronic equipment. Dispose of the product properly and not as part of the normal waste stream. Observe the regulations of the respective country: information can be obtained from the national authorities.

The data specified above only serve to describe the product.

No statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation of exercising judgment and verification. It must be remembered that our products are subject to a natural process of wear and ageing.

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