

User Manual
D.I.I.O. Digital Output Module (8 Points)
DIIO-DO-A-8

Specifications, Wiring Diagrams and Modbus Register Addresses

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TABLE OF CONTENTS

TABLE OF CONTENTS 2

INTRODUCTION..... 3

DEVICE SCHEMATIC AND IO CONNECTIONS..... 4

 TOP CONNECTIONS: 4

 BOTTOM CONNECTIONS AND INDICATIONS 4

 WIRING DIAGRAMS..... 5

DEVICE SETUP (DIIO SYSTEM PROGRAMMER SETUP PARAMETERS)..... 6

 LOCKS AND DEFAULTS..... 7

 DIGITAL OUTPUT CONTROL 7

SPECIFICATIONS 12

MODBUS ADDRESSES 13

 STANDARD REGISTER SET 13

Read Only Registers 13

Read/Write Registers..... 13

 EXTENDED REGISTER SET..... 14

Read Only Registers..... 14

Read/Write Registers..... 14

INTRODUCTION



The DIIO-DO-A-08 is part of the D.I.I.O. (Distributed Intelligent I/O) family. These devices are built up with various cards:

- Power Supply Cards (24VDC or 12VDC amongst others)
- Input/Output Cards (Digital Input, Digital Output, Analogue Input, Analogue Output)
- Microprocessor Cards (Various CPUs depending on the function)
- Communications Cards (Modbus Non Isolated RS232 or RS485 and Isolated RS485)
- Auxiliary Power Supply Cards (Isolated 5V or +/- 15V)

These units are pre-assembled and programmed by the manufacturer (DoZeener Controls) according to the customer's specifications. There are also standard modules such as the DIIO-DO-A-8.

The D.I.I.O. family of products can either be used in a stand-alone system, having a network controller (Example: DIIO-Netcon1) to negotiate information across the system or the individual modules forming part of a third party system comprising of PLCs, BMS Controllers, monitoring systems etc.

When ordering this unit the jumper settings on the IO cards must be specified. Below is a breakdown of the part number of the DIIO-DO-A-08.

Part Number:	DIIO-DO-A-8 (12VDC/MI485/A)
Part Number Description:	Device Code (Power Supply/Comms Card/IO Card Configuration)
Power Supply Options:	12VDC: 12VDC Power Supply 24VDC: 24VDC Power Supply
Comms Card Options:	MI485: Isolated RS485 MN485: Non Isolated RS485 MN232: Non Isolated RS232
IO Card Options:	A: (Configuration Type A: Relay Outputs, Changeover Contact) (This Device has only one type of configuration)

The IO Card Options are the jumper configurations on the IO cards. These can be changed by DoZeener Controls at manufacturing stage, but are not meant to be modified by the user. Opening the module casing will void the warranty of the product.

The digital input statuses are mapped into Modbus registers (Function 03). Appendix A shows a memory map of the Modbus registers.

Apart from the digital input statuses some statistics of the digital inputs are available. These are also shown in Appendix A.

This module as all the others in the DIIO family of products is configurable via the DIIO System Programmer. Please refer to the DIIO System Programmer Manual for more information (Document Code: DZC-DIO-08005EM-1).

DEVICE SCHEMATIC AND IO CONNECTIONS

TOP CONNECTIONS:

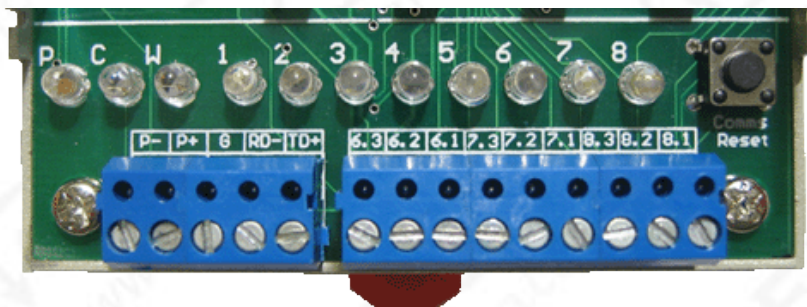


The Top Connections are for digital outputs 1 to 5

The Device Reset button resets the microcontroller. This is particularly useful when a new configuration has been downloaded to the device and needs to be restarted.

When new communication parameters such as baud rate, parity and Modbus address have been downloaded the device must be reset so that it acquires and starts using the new settings.

BOTTOM CONNECTIONS AND INDICATIONS



The bottom connections are for the power supply, communications and inputs 6 to 8.

Also on this side are indications for the following

- P:** Power Supply ON
- C:** Communication activity. Flashes when responding to a request.
- W:** Watchdog. Indicates the unit is healthy
- 1-8:** Input Statuses 1 to 8

The Comms Reset button should be used to reset the unit to default communication setting. When the unit is powered up while holding the button in the depressed position the following default settings are loaded:

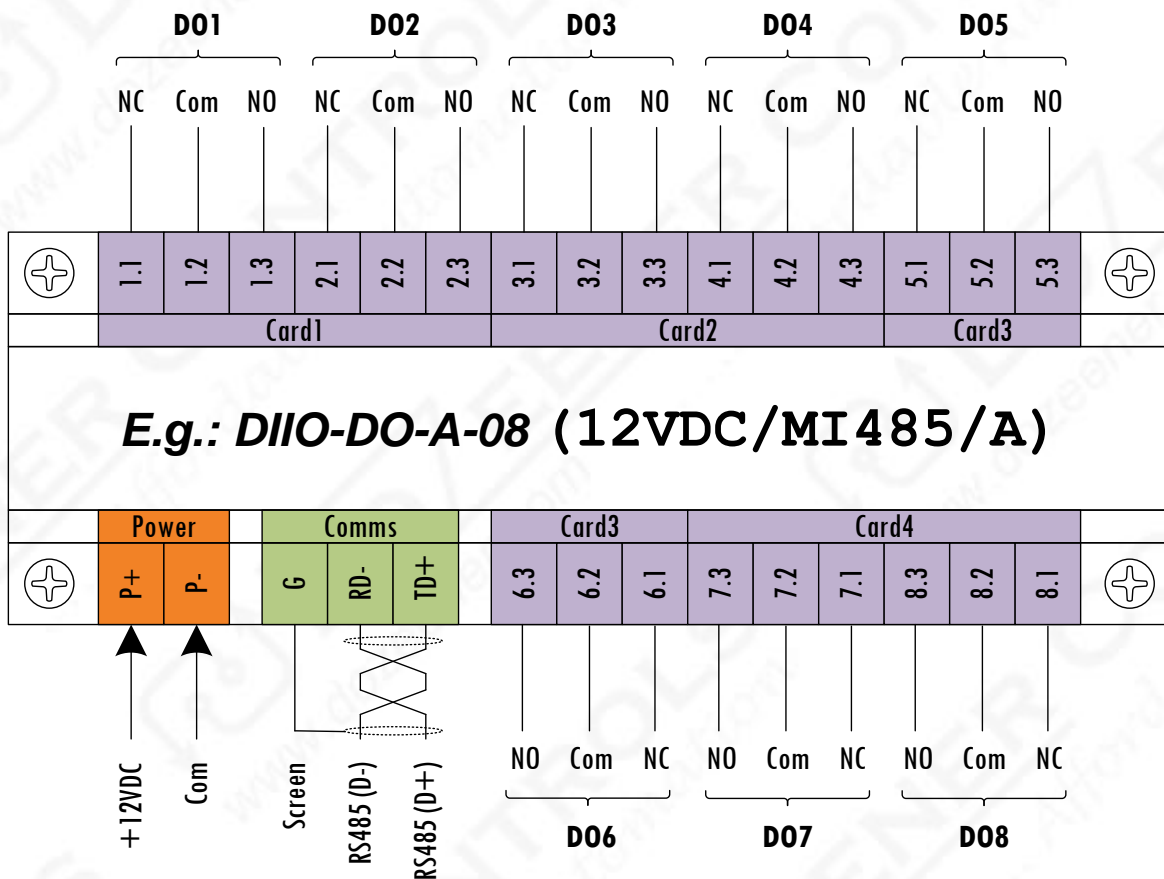
Baud Rate: 9600

Parity: None

Modbus Address: 1

Stop bits is set to 1 and data bits to 8. These are not configurable

WIRING DIAGRAMS



DEVICE SETUP (DIIO SYSTEM PROGRAMMER SETUP PARAMETERS)

The following parameters can be setup for the DIIO-DO-A-08:

The following table shows the parameters as displayed in the DIIO System Programmer:

DIIO-DO-A-08: 8 Digital Outputs, No RTC				
Device Parameters				
No	Description	Range (From)	Range (To)	Default Value
1	Lock for Register 11 - Channel Controls (0 = Unlocked \ 1 = Locked)	0	1	0
2	Lock for Register 12 - Channel Controls (0 = Unlocked \ 1 = Locked)	0	1	0
3	Lock for Register 13 - Channel Controls (0 = Unlocked \ 1 = Locked)	0	1	0
4	Lock for Register 14 - Channel Controls (0 = Unlocked \ 1 = Locked)	0	1	0
5	Lock for Register 15 - Channel Controls (0 = Unlocked \ 1 = Locked)	0	1	0
6	Lock for Register 16 - Channel Controls (0 = Unlocked \ 1 = Locked)	0	1	0
7	Lock for Register 17 - Channel Controls (0 = Unlocked \ 1 = Locked)	0	1	0
8	Lock for Register 18 - Channel Controls (0 = Unlocked \ 1 = Locked)	0	1	0
9	Lock for Register 19 - Channel Controls (0 = Unlocked \ 1 = Locked)	0	1	0
10	Lock for Register 20 - Channel Controls (0 = Unlocked \ 1 = Locked)	0	1	0
11	Lock for Register 101 - Statistics Reset (0 = Unlocked \ 1 = Locked)	0	1	0
12	Default Value for Register 11 - Channel Controls	0	65535	0
13	Default Value for Register 12 - Channel Controls	0	65535	0
14	Default Value for Register 13 - Channel Controls	0	65535	0
15	Default Value for Register 14 - Channel Controls	0	65535	0
16	Default Value for Register 15 - Channel Controls	0	65535	0
17	Default Value for Register 16 - Channel Controls	0	65535	0
18	Default Value for Register 17 - Channel Controls	0	65535	0
19	Default Value for Register 18 - Channel Controls	0	65535	0
20	Default Value for Register 19 - Channel Controls	0	65535	0
21	Default Value for Register 20 - Channel Controls	0	65535	0
22	Default Value for Register 101 - Reset Statistics	0	255	0
23	Digital Output 1 - Control Origin Register	11	20	11
24	Digital Output 1 - Control Origin Bit	0	15	0
25	Digital Output 1 - Control Lock (0 = Unlocked / 1 = Locked)	0	1	0
26	Digital Output 1 - Control Locked Default Value	0	1	0
27	Digital Output 2 - Control Origin Register	11	20	11
28	Digital Output 2 - Control Origin Bit	1	15	1
29	Digital Output 2 - Control Lock (0 = Unlocked / 1 = Locked)	0	1	0
30	Digital Output 2 - Control Locked Default Value	0	1	0
31	Digital Output 3 - Control Origin Register	11	20	11
32	Digital Output 3 - Control Origin Bit	2	15	2
33	Digital Output 3 - Control Lock (0 = Unlocked / 1 = Locked)	0	1	0
34	Digital Output 3 - Control Locked Default Value	0	1	0
35	Digital Output 4 - Control Origin Register	11	20	11
36	Digital Output 4 - Control Origin Bit	3	15	3
37	Digital Output 4 - Control Lock (0 = Unlocked / 1 = Locked)	0	1	0
38	Digital Output 4 - Control Locked Default Value	0	1	0
39	Digital Output 5 - Control Origin Register	11	20	11
40	Digital Output 5 - Control Origin Bit	4	15	4
41	Digital Output 5 - Control Lock (0 = Unlocked / 1 = Locked)	0	1	0

DIIO-DO-A-08: 8 Digital Outputs, No RTC

Device Parameters

No	Description	Range (From)	Range (To)	Default Value
42	Digital Output 5 - Control Locked Default Value	0	1	0
43	Digital Output 6 - Control Origin Register	11	20	11
44	Digital Output 6 - Control Origin Bit	5	15	5
45	Digital Output 6 - Control Lock (0 = Unlocked / 1 = Locked)	0	1	0
46	Digital Output 6 - Control Locked Default Value	0	1	0
47	Digital Output 7 - Control Origin Register	11	20	11
48	Digital Output 7 - Control Origin Bit	6	15	6
49	Digital Output 7 - Control Lock (0 = Unlocked / 1 = Locked)	0	1	0
50	Digital Output 7 - Control Locked Default Value	0	1	0
51	Digital Output 8 - Control Origin Register	11	20	11
52	Digital Output 8 - Control Origin Bit	7	15	7
53	Digital Output 8 - Control Lock (0 = Unlocked / 1 = Locked)	0	1	0
54	Digital Output 8 - Control Locked Default Value	0	1	0

LOCKS AND DEFAULTS

As standard on all DIIO Devices, the writable registers can be locked so that they cannot be changed by the user or the network controller. When a lock is enabled the register will become read only. A default value can be assigned when a lock is enabled.

Items 1 to 10 are locks for the Channel Controls. Items 12 to 21 are default values for the channel controls if the lock is enabled.

Item 11 is the lock for register 101, which is the statistics, reset register. Item 22 is the default value when the lock is enabled. When the lock is ON and the default value is 0, the digital output statistics cannot be reset.

DIGITAL OUTPUT CONTROL

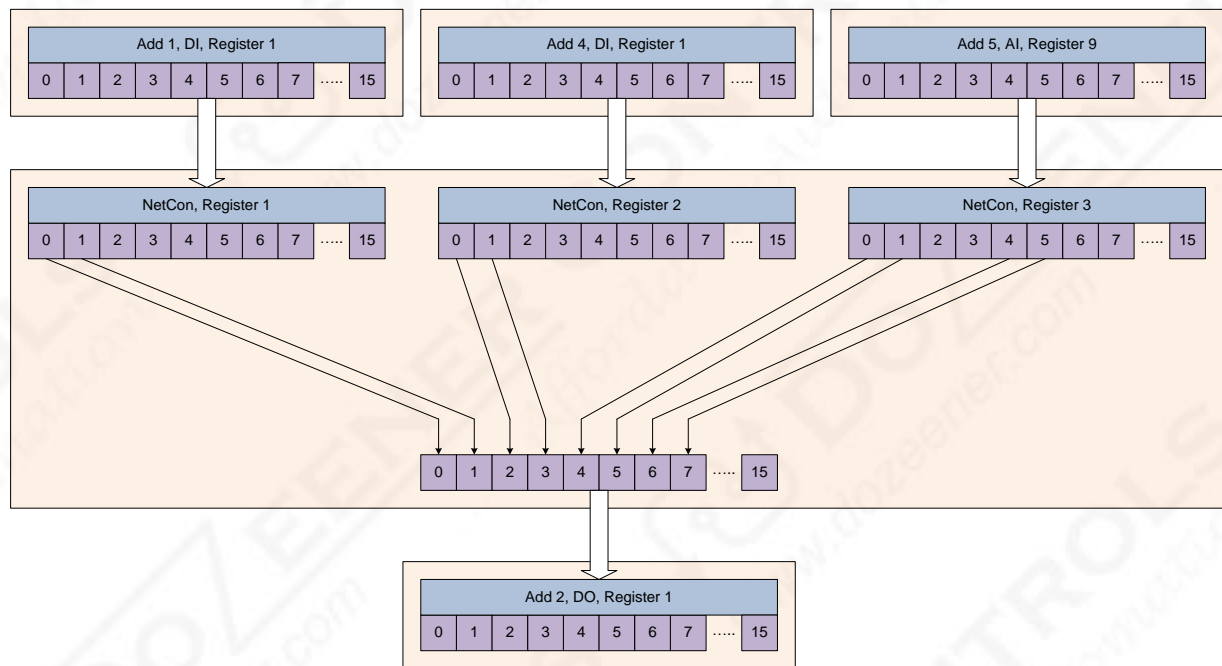
The 8 digital outputs can be controlled from any bit from the registers in the range 40011 to 40020. Items 23 to 54 control from where the physical digital outputs are set.

Items 23 to 26 define which bit controls digital output 1. It also defines if the output is locked at a particular state (Off or On)

No	Description	Range (From)	Range (To)	Default Value
23	Digital Output 1 - Control Origin Register	11	20	11
24	Digital Output 1 - Control Origin Bit	0	15	0
25	Digital Output 1 - Control Lock (0 = Unlocked / 1 = Locked)	0	1	0
26	Digital Output 1 - Control Locked Default Value	0	1	0

In the example above. Output 1 will be controlled by bit 0 in register 11. The output state is unlocked. When the output is locked the origin register and origin bit values are ignored and the output will be set according to the value of item 26. (0 = Output Off, 1 = Output On)

Example, considering the diagram below:



Addresses 1 and 4 are a digital input module. Address 5 is an analogue input module.

At Modbus register 1 at address 1, the following readings are available

- Bit 0: Status of Digital Input 1
- Bit 1: Status of Digital Input 2
- Bit 2: Status of Digital Input 3
- Bit 3: Status of Digital Input 4
- Bit 4: Status of Digital Input 5
- Bit 5: Status of Digital Input 6
- Bit 6: Status of Digital Input 7
- Bit 7: Status of Digital Input 8

At Modbus register 1 at address 1, the following readings are available

- Bit 0: Status of Digital Input 1
- Bit 1: Status of Digital Input 2
- Bit 2: Status of Digital Input 3
- Bit 3: Status of Digital Input 4
- Bit 4: Status of Digital Input 5
- Bit 5: Status of Digital Input 6
- Bit 6: Status of Digital Input 7
- Bit 7: Status of Digital Input 8

At Modbus register 9 at address 5, the following readings are available:

- Bit 0: Analogue Input 1 - Alarm, Lo
- Bit 1: Analogue Input 1 - Alarm, Hi
- Bit 2: Analogue Input 1 - Alarm, Input Out of High Scale
- Bit 3: Analogue Input 1 - Alarm, Input Out of Low Scale
- Bit 4: Analogue Input 2 - Alarm, Lo
- Bit 5: Analogue Input 2 - Alarm, Hi
- Bit 6: Analogue Input 2 - Alarm, Input Out of High Scale
- Bit 7: Analogue Input 2 - Alarm, Input Out of Low Scale
- Bit 8: Analogue Input 3 - Alarm, Lo
- Bit 9: Analogue Input 3 - Alarm, Hi
- Bit 10: Analogue Input 3 - Alarm, Input Out of High Scale
- Bit 11: Analogue Input 3 - Alarm, Input Out of Low Scale
- Bit 12: Analogue Input 4 - Alarm, Lo
- Bit 13: Analogue Input 4 - Alarm, Hi
- Bit 14: Analogue Input 4 - Alarm, Input Out of High Scale
- Bit 15: Analogue Input 4 - Alarm, Input Out of Low Scale

For more information on the digital input modules (DIIO-DI-A-08) please refer to the manual 'User Manual, D.I.I.O. Digital Input Module (8 Points) DIIO-DI-A-8', Document Code: DZC-DIO-08009EM-1.

For more information on the analogue input modules (DIIO-AI-A-08) please refer to the manual 'User Manual, D.I.I.O. Analogue Input Module (8 Points) DIIO-AI-A-8', Document Code: DZC-DIO-08013EM-1.

Address 2 is a digital output module.

The configuration in the diagram above will display the following statuses on the digital outputs of the digital output module. The digital outputs can then be wired up to alarm indication lamps, acoustic devices or even shut down part of the plant.

- Digital Output 1: Status of Digital Input 1 from Device with Address 1
- Digital Output 2: Status of Digital Input 2 from Device with Address 1
- Digital Output 3: Status of Digital Input 1 from Device with Address 4
- Digital Output 4: Status of Digital Input 2 from Device with Address 4
- Digital Output 5: Analogue Input 1 Lo Level Alarm from Device with Address 5
- Digital Output 6: Analogue Input 1 Hi Level Alarm from Device with Address 5
- Digital Output 7: Analogue Input 2 Lo Level Alarm from Device with Address 5
- Digital Output 8: Analogue Input 2 Hi Level Alarm from Device with Address 5

Transfer of the registers from the Digital Input and Analogue Input devices on addresses 1, 4 and 5 is done by the network controller, after it is configured properly.

The following is a snapshot of the DIIO system programmer indicating how the network controller must be configured.

D.I.I.O. System Programmer v1.0

Distributed Intelligent I/O (D.I.I.O.) System Programmer
Version 1.0

Communication Parameters | **Network Controller Device Setup** | Network Controller Register Setup | I/O Devices Setup | Configuration Data | Information

Devices 01 to 10 | Devices 11 to 20 | Devices 21 to 30 | Devices 31 to 40 | Devices 41 to 50 | Devices 51 to 60 | Devices 61 to 64

Digital Output Module Configuration Example

Setup Of Network Devices (Addresses 1 to 10)

Addr.	Enabled	Device Code	Device Description	User Description
01	<input checked="" type="checkbox"/>	1000	DIIO-DI-A-08 -> 8 Digital Inputs, No RTC	Digital Input Module - Water Tank Alarms
02	<input checked="" type="checkbox"/>	2000	DIIO-DO-A-08 -> 8 Digital Outputs, No RTC	Digital Output Module - Alarm Panel
03	<input type="checkbox"/>	0000	No Configuration	
04	<input checked="" type="checkbox"/>	1000	DIIO-DI-A-08 -> 8 Digital Inputs, No RTC	Digital Input Module - Security Panel
05	<input checked="" type="checkbox"/>	3000	DIIO-AI-A-08 -> 8 Analogue Inputs, No RTC	Analogue Input Module - Main Hall Temperatures
06	<input type="checkbox"/>	0000	No Configuration	
07	<input type="checkbox"/>	0000	No Configuration	
08	<input type="checkbox"/>	0000	No Configuration	
09	<input type="checkbox"/>	0000	No Configuration	
10	<input type="checkbox"/>	0000	No Configuration	

Code: 03006 | Type: Notice | Description: D.I.I.O. System Programmer Successfully Loaded And Initialised

D.I.I.O. System Programmer v1.0

Distributed Intelligent I/O (D.I.I.O.) System Programmer

Version 1.0

Communication Parameters | Network Controller Device Setup | **Network Controller Register Setup** | I/O Devices Setup | Configuration Data | Information

2. DIIO-DO-A-08 -> 8 Digital Outputs, No RTC ✓
 Digital Output Module - Alarm Panel Lock Settings Enable Device

Configuration

	Addr	Reg	Source Device Description	Source Register Description
Register 11	From Device	1	DIIO-DI-A-08 -> 8 Digital Inputs, No RTC	Digital Input Status - Channel 1
Register 12	From Device	4	DIIO-DI-A-08 -> 8 Digital Inputs, No RTC	Digital Input Status - Channel 1
Register 13	From Device	5	DIIO-AI-A-08 -> 8 Analogue Inputs, No RTC	Alarms Analogue Inputs 1 to 4
Register 14	Unchanged	1	DIIO-DI-A-08 -> 8 Digital Inputs, No RTC	Digital Input Status - Channel 1
Register 15	Unchanged	1	DIIO-DI-A-08 -> 8 Digital Inputs, No RTC	Digital Input Status - Channel 1
Register 16	Unchanged	1	DIIO-DI-A-08 -> 8 Digital Inputs, No RTC	Digital Input Status - Channel 1
Register 17	Unchanged	1	DIIO-DI-A-08 -> 8 Digital Inputs, No RTC	Digital Input Status - Channel 1
Register 18	Unchanged	1	DIIO-DI-A-08 -> 8 Digital Inputs, No RTC	Digital Input Status - Channel 1
Register 19	Unchanged	1	DIIO-DI-A-08 -> 8 Digital Inputs, No RTC	Digital Input Status - Channel 1
Register 20	Unchanged	1	DIIO-DI-A-08 -> 8 Digital Inputs, No RTC	Digital Input Status - Channel 1

Controller Address: 1 Download Current Upload Current Activate Save To File

IO Device Address: 2 Download All Upload All Clear Device Load From File

Code	Type	Description
Notice: 03006	Notice	D.I.I.O. System Programmer Successfully Loaded And Initialised

Transfer of the bits from the registers to the physical digital outputs is done internally in the digital output module.

The following table shows how the configuration parameters have to be configured

No	Description	Range (From)	Range (To)	Value
23	Digital Output 1 - Control Origin Register	11	20	11
24	Digital Output 1 - Control Origin Bit	0	15	0
25	Digital Output 1 - Control Lock (0 = Unlocked / 1 = Locked)	0	1	0
26	Digital Output 1 - Control Locked Default Value	0	1	0
27	Digital Output 2 - Control Origin Register	11	20	11
28	Digital Output 2 - Control Origin Bit	1	15	1
29	Digital Output 2 - Control Lock (0 = Unlocked / 1 = Locked)	0	1	0
30	Digital Output 2 - Control Locked Default Value	0	1	0
31	Digital Output 3 - Control Origin Register	11	20	12
32	Digital Output 3 - Control Origin Bit	2	15	0
33	Digital Output 3 - Control Lock (0 = Unlocked / 1 = Locked)	0	1	0
34	Digital Output 3 - Control Locked Default Value	0	1	0
35	Digital Output 4 - Control Origin Register	11	20	12
36	Digital Output 4 - Control Origin Bit	3	15	1
37	Digital Output 4 - Control Lock (0 = Unlocked / 1 = Locked)	0	1	0
38	Digital Output 4 - Control Locked Default Value	0	1	0
39	Digital Output 5 - Control Origin Register	11	20	13
40	Digital Output 5 - Control Origin Bit	4	15	0
41	Digital Output 5 - Control Lock (0 = Unlocked / 1 = Locked)	0	1	0
42	Digital Output 5 - Control Locked Default Value	0	1	0
43	Digital Output 6 - Control Origin Register	11	20	13
44	Digital Output 6 - Control Origin Bit	5	15	1
45	Digital Output 6 - Control Lock (0 = Unlocked / 1 = Locked)	0	1	0
46	Digital Output 6 - Control Locked Default Value	0	1	0
47	Digital Output 7 - Control Origin Register	11	20	13
48	Digital Output 7 - Control Origin Bit	6	15	4
49	Digital Output 7 - Control Lock (0 = Unlocked / 1 = Locked)	0	1	0
50	Digital Output 7 - Control Locked Default Value	0	1	0
51	Digital Output 8 - Control Origin Register	11	20	13
52	Digital Output 8 - Control Origin Bit	7	15	5
53	Digital Output 8 - Control Lock (0 = Unlocked / 1 = Locked)	0	1	0
54	Digital Output 8 - Control Locked Default Value	0	1	0

SPECIFICATIONS

- Electrical:** Relay Outputs with switching capabilities of 2A @ 30VDC or 0.5A @ 125VAC
Power Supply 12VDC to 30VDC *
- Comms:** RS232 or RS485, Isolated or Non Isolated *
Modbus RTU Protocol, Baud: 9600-38400, Parity: None/Odd/Even/Mark/Space
Configurable Modbus Address via software
- Hardware:** Removable Plug-in Terminals. Wire Connection from 28 to 16 AWG (1.5mm²)
DIN Rail Mounted Metal Enclosure
Push Buttons for Communication Parameters Reset and Device Reset
Plug In Card Internal Configuration. Inputs paired in two channels per card.
Separate Comms Card, Power Supply and IO Cards.
- Software:** Communication parameters are configured via windows based software.

* Different Part Numbers have to be used for the various configurations

MODBUS ADDRESSES

STANDARD REGISTER SET

READ ONLY REGISTERS

Register Name	Modbus Address	Description	Type
StatDO01	40001:00	Digital Output Status - DO1	Bit
StatDO02	40001:01	Digital Output Status - DO2	Bit
StatDO03	40001:02	Digital Output Status - DO3	Bit
StatDO04	40001:03	Digital Output Status - DO4	Bit
StatDO05	40001:04	Digital Output Status - DO5	Bit
StatDO06	40001:05	Digital Output Status - DO6	Bit
StatDO07	40001:06	Digital Output Status - DO7	Bit
StatDO08	40001:07	Digital Output Status - DO8	Bit

READ/WRITE REGISTERS

Register Name	Modbus Address	Description	Type
DigOut1	40011	Digital Output Commands	Bit
DigOut2	40012	Digital Output Commands	Bit
DigOut3	40013	Digital Output Commands	Bit
DigOut4	40014	Digital Output Commands	Bit
DigOut5	40015	Digital Output Commands	Bit
DigOut6	40016	Digital Output Commands	Bit
DigOut7	40017	Digital Output Commands	Bit
DigOut8	40018	Digital Output Commands	Bit
DigOut9	40019	Digital Output Commands	Bit
DigOut10	40020	Digital Output Commands	Bit

EXTENDED REGISTER SET

READ ONLY REGISTERS

Register Name	Modbus Address	Description	Type
ONTrDO1	40021	Global Number of Positive Transitions - DO1	Register
ONTrDO2	40022	Global Number of Positive Transitions - DO2	Register
ONTrDO3	40023	Global Number of Positive Transitions - DO3	Register
ONTrDO4	40024	Global Number of Positive Transitions - DO4	Register
ONTrDO5	40025	Global Number of Positive Transitions - DO5	Register
ONTrDO6	40026	Global Number of Positive Transitions - DO6	Register
ONTrDO7	40027	Global Number of Positive Transitions - DO7	Register
ONTrDO8	40028	Global Number of Positive Transitions - DO8	Register

READ/WRITE REGISTERS

Register Name	Modbus Address	Description	Type
RsStDO01	40101:00	Reset Statistics - DO1	Register
RsStDO02	40101:01	Reset Statistics - DO2	Register
RsStDO03	40101:02	Reset Statistics - DO3	Register
RsStDO04	40101:03	Reset Statistics - DO4	Register
RsStDO05	40101:04	Reset Statistics - DO5	Register
RsStDO06	40101:05	Reset Statistics - DO6	Register
RsStDO07	40101:06	Reset Statistics - DO7	Register
RsStDO08	40101:07	Reset Statistics - DO8	Register