MODBUS IP

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MODBUS IP

If your controller comprises an Ethernet card, you can use MODBUS IP commands with any connected device that supports the MODBUS protocol.

Within a MODBUS network, you can use standard MODBUS commands to read and write bit and register data; you can also read and write data to Vision controller Data Tables.

Any controller in the network may function as either master or slave via the controller's *Ethernet* port.

Ethernet uses star topology.



V2xx Vision OPLCs can be ordered with or without an Ethernet port. The Ethernet port enables you to implement communications via TCP/IP, such as MODBUS over TCP. To check if your Vision controller was supplied with an installed Ethernet port, first check the device's model number. In addition, note that the Ethernet port is an RJ-45-type port that is lined with metal.

Model Number	V 2 x x - 1 x - B 2 x B	V 2 x x - 1 x - B 2 x <u>E</u> B
		▲
	Supplied without	Supplied with
	an Ethemet port.	an Ethernet port

Unitronics currently supports both TCP and UDP, as explained in the topic About Ethernet. This topic also contains general information about Ethernet, IP addressing, sockets, and ports.

Specific information on implementing Ethernet is provided in the topic Using Ethernet.

Using MODBUS

Before using a MODBUS IP operation in your application, you must:

- Assign IP addresses to both master and slave devices. This is done by placing Ethernet Card Init FBs in the ladder application of both master and slave.
- Include at least 1 MODBUS Configuration FB in the ladder application of both master and slave.
- The condition that activates the Configuration must turn ON for a single program scan (positive transition recommended)
 However, the MODBUS configuration must be scanned during every program cycle--after the Configuration is activated. One way to ensure this is by placing the configuration in the first subroutine of the main module.

 Enable slave devices to be accessed by placing a Scan FB in the slave's Ladder application.

The figure below shows the elements required to carry out a Read Coils Operation.



Note that the operand addresses in slave PLCs are indirect addresses (pointers).



FB Operations

MODBUS IP Operations are located on the FBs menu.



MODBUS: Configuration

MODBUS: Scan

MODBUS: Read Coils (1)

MODBUS: Read Inputs (2)

Read Holding Registers (3)

Read Float Registers (3)

Read Input Registers (4)

Read Float Input Registers (4)

Force Coil (5)

<u>Preset Holding Register (6)</u>

Force Coils (15)

Preset Holding Registers (16)

Preset Float Registers (16)

Read/Write to Data Tables

MODBUS Status Operands

Examples

Sample applications may be found in the VisiLogic Examples folder. This folder contains field-tested VisiLogic (.vlp) sample applications. You can open this folder via the Help Menu.

The folder is typically located at: C:\ProgramFiles\Unitronics\VisiLogic\Examples\Verx.xx, where x.xx indicates the version of VisiLogic.

MODBUS: Configuration

A MODBUS Configuration FB must be included in both master and slave Ladder applications as shown below. MODBUS IP Operations are located on the *FBs menu*.



MI 0 Params Type Add Clip I D# 0 DEC Socket 0 D# 255 DEC Network ID 255 Retries D# 100 DEC TimeOut D# 3 DEC Retries D# 0 OUT MB 0 Function in Progress Slaves Slave 1 192.168.192.112 20000 255 Slave1 192.168.192.113 20000 255 3 4 5 5 6 5	Network ID 1	Name:	JS IP Co	nfigur	ation				
Params Type Add Formal Description D# 0 DEC Socket 0 Description D# 255 DEC Network ID 255 Retries D# 100 DEC TimeOut D# 3 DEC Retries DUT MB Function in Progress Slaves Index Description IP Address Port Slave ID Slave ID O 255 D Slave ID Slave ID O 255 D Slave ID Index Description IP Address Port Slave ID Slave ID O 255 D D ID ID	міо	MODBUS	IP_1						
D# 0 DEC Socket 0 D# 3 D# 255 DEC Network ID 255 Retries D# 100 DEC TimeOut D# 3 DEC Retries DUT MB 0 Function in Progress Slaves Index Description IP Address Port Slave ID 0 slave1 192.168.192.112 20000 255 1 slave 2 192.168.192.113 20000 255 2 slave 3 192.168.192.113 20000 255 3		Params	Туре	Add	()	Format	Descr	iption	
D# 3 Retries D# 100 D# 100 D# 3 DUT DEC TimeOut D# 3 DUT Network ID 255 TimeOut D# 3 DUT DUT D# 3 DUT DEC Retries Function in Progress Slaves Function in Progress Index Description IP Address Port Slave ID 0 slave1 192.168.192.112 20000 255 1 slave 2 192.168.192.113 20000 255 3 - - - 4 - - - 5 - - - - 6 - - - -			D#		0	DEC	Socke	et O	
Betries D# 100 DEC TimeOut D# 3 DEC Retries DUT MB 0 Function in Progress Slaves Index Description IP Address Port Slave ID 0 slave1 192.168.192.112 20000 255 2 slave 3 192.168.192.113 20000 255 2 slave 3 192.168.192.113 20000 255 3 4	D#3	IN	D#		255	DEC	Netwo	ork ID 255	
D# 3 DEC Retries DUT MB 0 Function in Progress Slaves Index Description IP Address Port Slave ID 0 slave1 192.168.192.112 20000 255 1 slave 2 192.168.192.112 20000 255 2 slave 3 192.168.192.113 20000 255 3	Retries		D#		100	DEC	TimeC	Jut	
DUT MB 0 Function in Progress Slaves Index Description IP Address Port Slave ID 0 slave1 192.168.192.112 20000 255 1 slave 2 192.168.192.112 20000 255 2 slave 3 192.168.192.113 20000 255 3			D#		3	DEC	Retrie	tS	
Slaves Port Slave ID 0 slave1 192.168.192.112 20000 255 1 slave 2 192.168.192.112 20000 255 2 slave 3 192.168.192.113 20000 255 3		IOUT	MB	0			Funct	ion in Progress	ţ.
Index Description IP Address Port Slave ID 0 slave1 192.168.192.112 20000 255 1 slave 2 192.168.192.112 20000 255 2 slave 3 192.168.192.113 20000 255 3		Slaves							
0 slave1 192.168.192.112 20000 255 1 slave 2 192.168.192.112 20000 255 2 slave 3 192.168.192.113 20000 255 3		Index De	scription		IP Address	Po	rt	Slave ID	
1 slave 2 192.168.192.112 20000 255 2 slave 3 192.168.192.113 20000 255 3		0 sla	rve1		192.168.192.112	200	000	255	
2 slave 3 192.168.192.113 20000 255 3 4 5 6		1 sla	rve 2		192.168.192.112	200	000	255	
3 4 5 6		2 sla	ive 3		192.168.192.113	200	000	255	
4 5 6		3							
5		4							
6		5							
		6			-				

Parameter	Туре	Function
Port Number	Constant	Click the drop-down arrows to view available ports; click the port you want to use.
Network ID	Constant	This number identifies the device on the network. You can either assign an ID via an MI, or directly via a constant number. The unit ID range is from 0-255. Do not assign the same ID number to more than one device.
Time out	Constant or MI	This is the amount of time a master device will wait for an answer from a slave. Time out units are defined in 10 msecs; a Time out value of 100 is equal to 1 second.
Retries	Constant or MI	This is the number of times a device will try to send a message.
Function in Progress	MB	This bit is ON when MODBUS is active. Use this as a condition bit for MODBUS operations to avoid communication conflicts.

- Note → Indirectly addressed parameters in a MODBUS Configuration FB are only read when the Configuration is called. Since a Configuration is generally called as a power-up task, if, for example Retries has been indirectly addressed, and the linked MI is updated, the new value will **not** be read into the Configuration. The value will only be updated until the Configuration is called.
 - While a master attempts to send a command, the Function In Progress bit is ON. The number of attempts that the master will make is the number in Retries +1, where '1' is the initial access attempt.
 - When a master attempts to access a slave device, and the slave does not answer,- the Function In Progress bit will turn ON. This bit will remain on according to the following:

(the number of retries + 1) x (Time Out), where '1' is the initial access attempt. Note that the Time Out parameter is in units of 10 msec.

Vision Slaves

In order to access Vision Controllers as slave devices and implement MODBUS commands, you must enter the IP addresses of the slave devices in the MODBUS IP configuration. This means that you must first assign IP addresses to each slave. This is done via the Ethernet Card Init FB, which must be configured as described in the topic Using_Ethernet.



Note ◆ Slave IP addresses can also be linked to an MI vector, note that the vector is 4 MIs long. The low byte of each MI provides the number for an octet within the IP address.

If, for example, the IP address is linked to MI 0, and the low bytes of MI 0 to MI 3 contain the values 192, 198, 192, 45, the IP address will be 192.198.192. 45.

The Ladder application below enables the controller act as a MODBUS master and read coils in a slave PLC. The same PLC can also act as a slave, if a Scan_EX operation is included in the application.



MODBUS: ScanEX and Scan

Scan_EX enables a master device to access a slave PLC. MODBUS IP Operations are located on the *FBs menu*.

	FB's	•			
	1	Check For Updates			
	<u> </u>	PID •			
		Linearization 🕨			
		Com Port 🕨			
	1 06	Ethernet >			
	12	Events >			
		PWM 🕨			
	.	MODBUS +			
11 Configuration	T)	MODBUS R +			
. 📿 Scan	1	sms ∿ 🕨			
Read Coils (1)	-	Protocol •			
Read Inputs (2)					
. Read holding registers (3)					
Read float registers (3)	1.1	e e e e e			
Read input registers (4)	1.1				
 Read float registers (4) 					
Force Coll (5)	1.1				
Preset holding register (6)					
Loopback Test (8)					
Force Coils (15)	1.1				
Preset holding registers (16)					
Preset float registers (16)					
Belp	1.1	· · · ·]			
	·				
-EN ENO-					
MODBUS IP					
SCAN_EX					
MODBUS_2 🎏 MODBU	IS IP	ScanEX			
Select Nan	ie:				
MODBUS	_1	-			
MODBUS	1				
MODBUS	2	2	01	Canaal	L Halo
MODBUS		P[]	UK	Lancei	Heip

Note • Scan_Ex is recommended for new applications.

About Scan and Scan_EX

MODBUS Versions **previous to V2.01** offered only the **Scan** FB. Scan is still supported for older, working applications. When MODBUS operations accessed double registers (5100 addresses and higher), using odd addresses, such as 5101, there were incompatibility issues.

Scan_EX is recommended for new applications.

When ScanEX receives an input parameter in the 32-bit range (for example, 5100{ML}), it automatically takes double-register values.

If, for example, ScanEX receives a Read Register(6) request for **5100**, it returns the values in 5100 **and** 5101. If, however, ScanEX receives Read Register(6) request for **5101**, it returns Status Message #2-- since 5101 provides the 'high' bytes of the 32-bit register, it is not a legal address.

Read Coils (1)

Use this command to read the status of a selected group of coils and write them into a vector. The coil's status is written into a vector of MBs in the master PLC. MODBUS IP Operations are located on the *FBs menu*.

Slave: Start of	Constant,	The start of the vector of coils to be read (data source).
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Vector	MI, ML, or DW	Note ♦ Check topic Slave Address Tables.
Read: Vector Length	Constant or MI	The vector length. Note ♦ A MODBUS command cannot read/write more than 1900 bit operands at one time. In addition, 0 is not a legal length.
Master: Start of Vector	MB	Shows a message number. To check status and diagnose errors, check the MODBUS Status Operands.
Status Messages	MI	Shows a message number. To check status and diagnose errors, check the MODBUS Status Operands.
Total Sessions	DW	This is the number of times the master PLC will attempt to access the slave device. Note that this is a simple incremental counter. Initialize it by storing 0 into the selected DW.
Acknowledgements	DW	This is the number of times the slave device answers.

Read Inputs (2)

Use this command to read the status of a selected group of inputs in a slave device and write them into a vector. The inputs's status is written into a vector of MBs in the master PLC. MODBUS IP Operations are located on the *FBs menu*.

	🌦 мор	BUS II	P Read	i Inpu	ts (2)			
EN ENO	- Select N	lame:						
MODBUS IP	INODE	US IP_	3		-			
Slave MB 8 Master: Start 0f	Params	Туре	Add		60	Format	Description	
		MI	62			DEC	Slave	
NI 02	IN	MI	63			DEC	Slave: Start Of Vector	
MI 03 MI 00 Status Massages		ML	65			DEC	Read: Vector Length	
Sidius Messages		MB	8				Master: Start Of Vector	
	0.17	MI	66			DEC	Status Messages	
MI 65 DW 32	001	DW	32			DEC	Total Sessions	
Head: Vector		DW	33			DEC	Acknowledgements	
and the second								
DW 33						Ok	Cancel	Help

Parameter	Туре	Function
Slave ID	Constant or MI	The IP address of the slave device containing the inputs to be read (data source).
Slave: Start of Vector	Constant, MI, ML, or DW	The start of the vector of inputs to be read (data source). Note ♦ Check topic Slave Address Tables.
Read: Vector Length	Constant or MI	The vector length. Note ♦ A MODBUS command cannot read/write more than 1900 bit operands at one time. In addition, 0 is not a legal length.
Master: Start of Vector	MB	This is the start of a vector of MBs that will contain the inputs' status in the master (data destination).
Status Messages	МІ	Shows a message number. To check status and diagnose errors, check the MODBUS Status Operands.
Total Sessions	DW	This is the number of times the master PLC will attempt to access the slave device. Note that this is a simple incremental counter. Initialize it by storing 0 into the selected DW.
Acknowledgements	DW	This is the number of times the slave device answers.

Read Holding Registers (3)

Use this command to read the values of a selected group of registers in a slave PLC and write them into a defined vector of registers in the master. MODBUS IP Operations are located on the *FBs menu*.

			FB'	\$	•						
			3	Ċł	nec	kЕ	orl	Jpda	ates	5	
			1	PI	D						Ы
				Lir	ne a	riza	atio	n			•
				Co	m	Por	t				•
			1 04	Et	he	rne	t				5
			12	Εv	en	ts.					5
		,		P٧	MM	1					•
			Ŧ	м	OD	BU:	5				•
·	łtł	Configuration	Ð	M	OD	6U!	5 fR				۲
1	Q	Scan		SΝ	15		h)			•
÷		Read Coils (1)	-	Pr	oto	col	I				•
1		Read Inputs (2)		1	Ĩ	1	÷.	Т	Т		
		Read holding registers (3)		,			÷.	L			
÷		Read float registers (3)	н н. 1	÷		÷	÷.	L			
1		Read input registers (4)	11	1	1	1	1	L			
		Read float registers (4)			-			L			
÷		Force Coll (5)	· •		1		r.	L			
1		Preset holding register (6)	11	1	÷.	1	1	L			
		Loopback Test (8)			-			ь	1		
·		Force Coils (15)	• •	·	ł		÷				
1		Preset holding registers (16)		1	Ĵ,	1	1				
-		Preset float registers (16)									
;	Ľ	Help	: :	ţ	Ĵ	Ĵ	ţ,	H			

EN ENC		🌦 MODBUS IP Read holding registers (3)								
MODBUS IP		- Select N	lame: -							
Slave - MODBUS I	MI 49 Master: Start Of	MODB	MODBUS IP_2							
		Params	Туре	Add	()	60	Format	Description		
MI 45	MI 51		MI	44			DEC	Slave		
Slave: Start Of	Status Messages	IN	MI	45			DEC	Slave: Start Of Vecto	x	
			MI	46			DEC	Read: Vector Length		
MI 46	DW 26		MI	49			DEC	Master: Start Of Vect	or	
Read: Vector	Total Sessions	OUT	MI	51			DEC	Status Messages		
			DW	26			DEC	Total Sessions		
	DW 27		DW	27			DEC	Acknowledgements		
	Acknowledgeme									
							Ok	Cancel	Help	

Parameter	Туре	Function
Slave ID	Constant or MI	The IP address of the device containing the registers to be read (data source).
Slave: Start of Vector	Constant, MI, ML, or DW	The start of the vector of registers to be read (data source). Note ♦ Check topic Slave Address Tables.
Read: Vector Length	Constant, MI, ML, or DW	The vector length Note ♦ A MODBUS command cannot read more than 124 16-bit integers, 62 double registers, or 64 float registers at one time. In addition, 0 is not a legal length. ♦ If, within the Slave: Start of Vector parameter, the selected register type is a 32-bit double register (slave addresses 5100 and greater)the preset vector length must be doubled as well. If, for example: Slave: Start of Vector parameter is set to 6300, and You wish to preset 4 registers, for a total of 16 bytes

		- You must set the Preset Vector length to 8. Note that this means that, in these cases, the Preset: Vector Length parameter will always be an even number.
Master: Start of Vector	MI	This is the start of a vector of MIs that will contain the registers' values in the master (data destination).
Status Messages	MI	Shows a message number. To check status and diagnose errors, check the MODBUS Status Operands.
Total Sessions	DW	This is the number of times the master PLC will attempt to access the slave device. Note that this is a simple incremental counter. Initialize it by storing 0 into the selected DW.
Acknowledgements	DW	This is the number of times the slave device answers.

Read Float Registers (3)

Use this command to read the values of a selected group of floating point registers in a slave device and write them into a defined vector of registers in the master. Values after the decimal point are rounded to the nearest whole value. MODBUS IP Operations are located on the *FBs menu*.

EN ENC	🗯 MODBUS IP Read float registers (3)												
Slave - MODBUS IP	MI 49 Master: Start Of	- Select N	Select Name: MODBUS IP_2										
		Params	Type	Add	۵	66	Format	Description					
MI 45	MI 51		MI	44			DEC	Slave					
Slave: Start Ur	Status Messages	IN	MI	45			DEC	Slave: Start Of Vector					
			MI	46			DEC	Read: Vector Length					
MI 46	DW 26		MI	49			DEC	Master: Start Of Vector					
Read: Vector	Total Sessions	0.07	MI	51			DEC	Status Messages					
		001	DW	26			DEC	Total Sessions					
	DW 27		DW	27			DEC	Acknowledgements					
	Acknowledgeme												
							Ok	Cancel H	elp				

Parameter	Туре	Function
Slave ID	Constant or MI	The IP address of the device containing the registers to be read (data source).
Slave: Start of Vector	Constant, MI, ML, or DW	The start of the vector of registers to be read (data source). Note ♦ Check topic Slave Address Tables.
Read: Vector Length	Constant, MI, ML, or DW	The vector length Note A MODBUS command cannot read more than 124 16-bit integers, 62 double registers, or 64 float registers at one time. In addition, 0 is not a legal length. If, within the Slave: Start of Vector parameter, the selected register type is a 32-bit double register (slave addresses 5100 and greater)the preset vector length must be doubled as well. If, for example: Slave: Start of Vector parameter is set to 6300, and You wish to preset 4 registers, for a total of 16 bytes You must set the Preset Vector length to 8. Note that this means that, in these cases, the Preset: Vector Length parameter will always be an even number.
Master: Start of Vector	MI	This is the start of a vector of MIs that will contain the registers' values in the master (data destination).
Status Messages	MI	Shows a message number. To check status and diagnose errors, check the MODBUS Status Operands.
Total Sessions	DW	This is the number of times the master PLC will attempt to access the slave device. Note that this is a simple incremental counter. Initialize it by storing 0 into the selected DW.
Acknowledgements	DW	This is the number of times the slave device answers.

Read Input Registers (4)

Use this command to read the values of a selected group of registers in a slave PLC and write them into a defined vector of registers in the master. MODBUS IP Operations are located on the *FBs menu*.

EN ENC	2	🌦 MODBUS IP Read input registers (4)												
Slave - MODBUS IP B.I.R #4	MI 49 Master: Start Of	- Select N	- Select Name: MODBUS IP_2											
		Params	Type	Add	۹	66	Format	Description						
MI 45	MI 51		ML	44			DEC	Slave						
Slave: Start Ur	Status Messages	IN	MI	45			DEC	Slave: Start Of Vector						
			MI	46			DEC	Read: Vector Length						
MI 46	DW 26		MI	49			DEC	Master: Start Of Vect	or					
Read: Vector	Total Sessions		MI	51			DEC	Status Messages						
			DW	26			DEC	Total Sessions						
	DW 27		DW	27			DEC	Acknowledgements						
	Acknowledgeme			_										
							Ok	Cancel	Help					

Parameter	Туре	Function
Slave ID	Constant or MI	The IP address of the device containing the registers to be read (data source).
Slave: Start of Vector	Constant, MI, ML, or DW	The start of the vector of registers to be read (data source). Note ♦ Check topic Slave Address Tables.
Read: Vector Length	Constant, MI, ML, or DW	The vector length Note ♦ A MODBUS command cannot read more than 124 16-bit integers, 62 double registers, or 64 float registers at one time. In addition, 0 is not a legal length. If, within the Slave: Start of Vector parameter, the selected register type is a 32-bit double register (slave addresses 5100 and greater)the preset vector length must be doubled as well. If, for example: Slave: Start of Vector parameter is set to 6300, and You wish to preset 4 registers, for a total of 16 bytes

		- You must set the Preset Vector length to 8. Note that this means that, in these cases, the Preset: Vector Length parameter will always be an even number.
Master: Start of Vector	MI	This is the start of a vector of MIs that will contain the registers' values in the master (data destination).
Status Messages	MI	Shows a message number. To check status and diagnose errors, check the MODBUS Status Operands.
Total Sessions	DW	This is the number of times the master PLC will attempt to access the slave device. Note that this is a simple incremental counter. Initialize it by storing 0 into the selected DW.
Acknowledgements	DW	This is the number of times the slave device answers.

Read Float Registers (4)

Use this command to read the values of a selected group of floating point registers in a slave device and write them into a defined vector of registers in the master. Values after the decimal point are rounded to the nearest whole value. MODBUS IP Operations are located on the *FBs menu*.

		ſ	FB's -									
		-	3	đ	nec	kЕ	or l	Jp	dal	tes		1
			E.	PI	PID							
			2	Lir	iea	riza	ətio	n			,	
				Co	m	Por	t				,	I
			剐	Et	her	rne	t				•	I
			12	Ev	en	ts		_	_		,	I
		-		P٧	٧M						,	
			T	M	DD	BU:	5				•	I
·	łtł	Configuration	Đ	М	DD	BU:	5 fR	2			₽	l
	Q	Scan		SN	15		M	6			•	1
·		Read Coils (1)	-	Pr	oto	col	I				•	I
1		Read Inputs (2)			Ĵ.		÷	T				1
		Read holding registers (3)						1				
·		Read float registers (3)	с. с.	÷		1	÷	1				
1		Read input registers (4)	11	1	1	1	1	1				
		Read float registers (4)			-			1				
·		Force Coll (5)	• •		1		÷	1				
1		Preset holding register (6)	11	1	÷.	1	1	1				
		Loopback Test (8)			-				_			
·		Force Coils (15)	• •	÷	1		1					
1		Preset holding registers (16)		1	ĵ,	÷.	1					
-		Preset float registers (16)	-					-				
;	Ľ	Help		ţ	ĵ,	ţ,	ĵ,					

				MODBOS IP Read float registers (4)									
		BFB #4		Select	Vame: -								
Slav	/e		MI 42 Master: Start Of	MODE	US IP_	2		•					
				Params	Туре	Add	(je	60	Format	Description			
ML4	0		MI 43		MI	39			DEC	Slave			
Slave: S	tart Of		Status Messages	IN	MI	40			DEC	Slave: Start Of \	/ector		
				·	MI	41			DEC	Read: Vector Le	ngth		
MI 4	1		DW 24		MI	42			DEC	Master: Start Of	Vector		
head: v	rector		I otal Sessions	Ουτ	DW/	43			DEC	Total Sessions	\$		
			DV/ 05		DW/	25			DEC	Acknowledgem	ants		
			Acknowledgeme							Conned	L Hala		
									ĸ	Lancel	Heip		
Parameter		Туре	Function										
Slave ID		Constant or MI	The IP addr	ess of th	e devi	ice co	ntainin	g the re	gisters	to be read (da	ta source).		
Slave: Start of Vector Constant, MI, ML, or DW The start of the vector of registers to be read (data source). Note ♦ Check topic Slave Address Tables. ♦ If, within the Slave: Start of Vector parameter, the selected register type is a 32-bit double register (slave addresses 5100 and greater)the preset vector length must be doubled as well. If, for example: - Slave: Start of Vector parameter is set to 6300, and - You wish to preset 4 registers, for a total of 16 bytes - You must set the Preset Vector length to 8. Note that this means that, in these cases, the Preset: Vector Length parameter will always be an even number.								e is r r					
Read: Vector Length		Constant, MI, ML, or DW	The vector le Note ♦ A M double regist length.	ength ODBUS ters, or 6	comm 64 floa	nand c t regis	annot sters at	read mo one tin	ore than ne. In ac	124 16-bit int Idition, 0 is no	egers, 62 t a legal		
Master: Start o Vector	f	MI	This is the st master (data	art of a destina	vector tion).	of MI	s that v	vill cont	ain the r	egisters' value	es in the		
Status Messag	jes	МІ	Shows a me MODBUS St	ssage nu atus Op	umber erands	. To c s.	heck s	tatus ar	nd diagn	ose errors, ch	eck the		
Total Sessions	;	DW	This is the nu device. Note the selected	umber of that this DW.	f times is a s	the n imple	naster incren	PLC wil nental c	ll attemp ounter.	ot to access th Initialize it by s	e slave storing 0 inf	to	
Acknowledgen	nents	DW	This is the nu	umber of	ftimes	s the s	lave de	evice ar	nswers.				

Force Coil (5)

Use this command to force the status of a selected coil in a slave PLC. The coil's status is forced according to the status of a selected MB in the master PLC. MODBUS IP Operations are located on the FBs menu.

	С. С. С. С. 🌦 і мо	odbus ip f	orce Coi	l (5)		
EN ENO MODBUS IP F.C #5 MODBUS_1 = Sta	MI 9	ect Name: DDBUS_1		•		
	Para	ams Type	Add 🧃	66	Format	Description
MI8	DW 2	MI	7		DEC	Slave ID
Slave: Uperand	otal Sessions IN	I MI	8		DEC	Slave: Operand Address
		MB	3			Value To Force
MB 3	DW 3	MI	9		DEC	Status Messages
Value To Force Ac	knowledgeme OU	JT DW	2		DEC	Total Sessions
		DW	3		DEC	Acknowledgements
			[Ok	Ca	incel Help

Parameter	Туре	Function
Slave ID	Constant or MI	The IP address of the device containing the coil to be forced (data source).
Slave Address	Constant, MI, ML, or DW	The address of the coil to be forced (data target). Note ♦ Check topic Slave Address Tables.
Value to Force	M, SB, I, O,T	This MB is located in the master PLC; this MB contains the status to be forced (data source). If, for example, the status of this MB is OFF, the status of the coil in the slave will be forced to OFF. Note ♦ A MODBUS command cannot read/write more than 1900 bit operands at one time. In addition, 0 is not a legal length.
Status Messages	MI	Shows a message number. To check status and diagnose errors, check the MODBUS Status Operands
Total Sessions	DW	This is the number of times the master PLC will attempt to access the slave

device. Note that this is a simple incremental counter. Initialize it by storing 0 into the selected DW.

This is the number of times the slave device answers.

Preset Holding Register (6)

Use this command to preset the value of a single register in a slave PLC. The value is set in a register contained in the master PLC. MODBUS IP Operations are located on the *FBs menu*.

Slave: Operand Address	Constant, MI, ML, or DW	The address of the register to be preset (target). Note ♦ Check topic Slave Address Tables
Value to Preset	Constant, MI, SI, ML, SL, DW, SDW or T	This is the address of the register containing the value in the master PLC (source). This value will be written into the slave's register, the register that is to be preset.
Status Messages	MI	Shows a message number. To check status and diagnose errors, check the MODBUS Status Operands
Total Sessions	DW	This is the number of times the master PLC will attempt to access the slave device. Note that this is a simple incremental counter. Initialize it by storing 0 into the selected DW.
Acknowledgements	DW	This is the number of times the slave device answers.

Loopback Test (8)

Use this command to send a test message to a slave device and receive Acknowledgements when communications are functioning properly. MODBUS IP Operations are located on the *FBs menu*.

		ſ	FB's -								
		-	3	đ	nec	kF	or L	lpda	ate	s	
			100	PID							5
			2	Lir	hea	riza	stio	n			•
				Co	m	Por	t				•
			刷	Et	her	ne	t				ы
			11	Ev	en	ts					5
		-		P٧	мм						•
			Ŧ	M	OD	BUS	5				•
•	łtł	Configuration	1	M	OD	BUS	5 fP				۲
	Q	Scan		SN	15		h				•
·		Read Coils (1)	-	Pr	oto	col					•
1		Read Inputs (2)				÷	÷.	Т	T		
		Read holding registers (3)						L	l		
ł		Read float registers (3)	1.1	÷		1	1	L	l		
1		Read input registers (4)	11	1	1	1	1	L	l		
		Read float registers (4)			-			L	l		
·		Force Coll (5)	1.1		-		1	L	l		
1		Preset holding register (6)	11	1	1	1	1	L	l		
		Loopback Test (8)			-		÷	ь	ł		
·		Force Coils (15)	• •	1	1		1				
1		Preset holding registers (16)	11	1	1	1	1				
-		Preset float registers (16)	-								
;	Ľ	Help	; ;	Ĵ	Ĵ	ì	ĵ,	-			

	🌦 MODBI	US: IP	Loop	back T	est (8)			
Slave ID 1 LB #8 MI 0 Status Messages	Select N MODB	lame:			•			
DW0	Params	Туре	Add	(i)	66	Format	Description	
Total Sessions	IN	D#		ĩ		DEC	Slave ID 1	
		MI	0			DEC	Status Messages	
DW1 ·	OUT	DW	0			DEC	Total Sessions	
Acknowledgeme		DW	1			DEC	Acknowledgements	
<u></u>					Ok		Cancel Help	

Parameter	Туре	Function
Slave ID	Constant or MI	The IP address of the device to be checked.
Status Messages	МІ	Shows a message number. To check status and diagnose errors, check the MODBUS Status Operands.
Total Sessions	DW	This is the number of times the master PLC will attempt to access the slave device. Note that this is a simple incremental counter. Initialize it by storing 0 into the selected DW.
Acknowledgements	DW	This is the number of times the slave device answers.

Force Coils (15)

Use this command to force the status of a selected group of coils in a slave PLC. The coils' status is forced according to the status of a group of MBs in the master PLC. MODBUS IP Operations are located on the *FBs menu*.

EN ENC		ا 🔅	MODBL	JS: IP	For	ce Coils	(15)			\mathbf{X}
Slave ID F.C #15 MODBUS_1	MI 13 Status Messages	[s	elect N MODBL	ame: JS_1			•			
MI 11	DW 4	P	arams	Туре	Add	۵	66	Format	Description	
Slave: Start Of	Total Sessions			MI	10			DEC	Slave ID	
			151	MI	11			DEC	Slave: Start Of Vector	
MB 4	DW 5		IN	MB	4				Master: Start Of Vector	
Master: Start Of	Acknowledgeme			MI	12			DEC	Force: Vector Length	
				MI	13			DEC	Status Messages	
MI 12			OUT	DW	4			DEC	Total Sessions	
Force: Vector				DW	5			DEC	Acknowledgements	
		-					Ok		Cancel Help	

Parameter	Туре	Function
Slave ID	Constant or MI	The IP address of the slave device containing the coils to be forced (target).
Slave:Start of Vector	Constant, MI, ML, or DW	The start of the vector of coils to be forced (data target). Note ♦ Check topic Slave Address Tables.
Master: Start of Vector	MI, SB, I, O,T	This is the start of a vector of MBs that will contain the coils' status in the master (data source).
Force: Vector Length	Constant or MI	The vector length. Note ♦ A MODBUS command cannot read/write more than 1900 bit operands at one time. In addition, 0 is not a legal length.
Status Messages	MI	Shows a message number. To check status and diagnose errors, check the MODBUS Status Operands
Total Sessions	DW	This is the number of times the master PLC will attempt to access the slave device. Note that this is a simple incremental counter. Initialize it by storing 0 into the selected DW.
Acknowledgements	DW	This is the number of times the slave device answers.

Preset Holding Registers (16)

Use this command to preset the value of a group of registers in a slave PLC. The values are set in a vector of registers contained in the master PLC. MODBUS IP Operations are located on the *FBs menu*.

	or IVII	
Slave: Start of Vector	Constant, MI, ML, or DW	The start of the vector of registers to be preset (target). Note ♦ Check topic Slave Address Tables.
Master: Start of Vector	Constant, MI, SI, ML, SL, DW, SDW or T	This is the start of a vector of MIs that will contain the registers' values in the master (data source).
Preset: Vector Length	Constant, MI, ML, or DW	The length of the vector of registers in both master and slave. Note ♦ A MODBUS command cannot read more than 124 16-bit integers, 62 double registers, or 64 float registers at one time. In addition, 0 is not a legal length. ♦ If, within the Slave: Start of Vector parameter, the selected register type is

		 a 32-bit double register (slave addresses 5100 and greater)the preset vector length must be doubled as well. If, for example: Slave: Start of Vector parameter is set to 6300, and You wish to preset 4 registers, for a total of 16 bytes You must set the Preset Vector length to 8. Note that this means that, in these cases, the Preset: Vector Length parameter will always be an even number.
Status Messages	MI	Shows a message number. To check status and diagnose errors, check the MODBUS Status Operands.
Total Sessions	DW	This is the number of times the master PLC will attempt to access the slave device. Note that this is a simple incremental counter. Initialize it by storing 0 into the selected DW.
Acknowledgements	DW	This is the number of times the slave device answers.

Preset Float Registers (16)

Use this command to preset the value of a group of floating point registers in a slave PLC. The values are set in a vector of registers contained in the master PLC. Values after the decimal point are rounded to the nearest whole value. MODBUS IP Operations are located on the *FBs menu*.

			FB	\$	•						
			3	d	hec	kР	or	Up	oda	tes	
			E.	PI	D						5
				Li	nea	riz	ati	ion			•
				G	om	Po	rt				•
			R04	Et	he	rne	ŧ				•
			11	E	/en	ts					•
				P١	₩М	1					•
_			Ŧ	м	OD	BU	5				۲
1	1	Configuration	Ð	М	OD	6U	۶ſ	P			۲
	Ş	Scan		SI	ИS		P	U			•
•		Read Coils (1)	-	Pr	oto	co	l.				•
1		Read Inputs (2)									
		Read holding registers (3)									
·		Read float registers (3)	1.1	÷			1				
1		Read input registers (4)	11	1	1	1	1				
		Read float registers (4)			-						
·		Force Coil (5)	1.1		-						
1		Preset holding register (6)	11	1	1	1	1				
		Loopback Test (8)			-						
·		Force Coils (15)	• •		-						
		Preset holding registers (16)		1	1	Ĵ,	1				
		Preset float registers (16)									
]	2	Help	: :	ŝ	ŝ	Ĵ	1		_	1	

EN EN		🌦 MODB	US IP	Pre	set flo	at regist	ers (16)			×
Slave ID 5 - MODBUS_	MI 50 Status Messages	Select N MODB	lame: US_1			•				
MI 47	DW 20	Params	Type	Add	(î)	60	Format	Description		
Slave: Start Of	Total Sessions		D#		5		DEC	Slave ID 5		
			MI	47			DEC	Slave: Start	Of Vector	
MI 48	DW 21	IN	MI	48			DEC	Master: Star	t Of Vector	
Master: Start Ur	Acknowledgeme		D#		49		DEC	Preset: Veci	tor Length	
			MI	50			DEC	Status Mess	ages	
D# 49		OUT	DW	20			DEC	Total Sessio	ons	
Preset: Vector	_ · · · · · · · ·		DW	21			DEC	Acknowledg	gements	
	::::::					Ok		Cancel	Help	

Parameter	Туре	Function
Slave ID	Constant or MI	The IP address of the device containing the register to be preset (target).
Slave: Start of Vector	Constant, MI, ML, or DW	The address of the register to be preset (target). Note ♦ Check topic Slave Address Tables.
Master: Start of Vector	MI, SI, ML, SL, DW, SDW or T	This is the address of the register containing the value in the master PLC (source). This value will be written into the slave's register, the register that is to be preset.
Preset: Vector Length	Constant, MI, ML, or DW	The length of the vector of registers in both master and slave. Note ♦ A MODBUS command cannot read more than 124 16-bit integers, 62 double registers, or 64 float registers at one time. In addition, 0 is not a legal length. ♦ If, within the Slave: Start of Vector parameter, the selected register type is a 32-bit double register (slave addresses 5100 and greater)the preset vector length must be doubled as well. If, for example:
Status Messages	MI	Shows a message number. To check status and diagnose errors, check the MODBUS Status Operands.
Total Sessions	DW	This is the number of times the master PLC will attempt to access the slave device. Note that this is a simple incremental counter. Initialize it by storing 0 into the selected DW.
Acknowledgements	DW	This is the number of times the slave device answers.

Read/Write from Data Tables

Use these commands to access the bytes in Vision data tables **without** reference to table structure.

To determine the byte number of a data table cell, hold the cursor over the data table cell. A Tooltip opens, displaying the byte number.

A MODBUS command cannot read/write more than 242 DT bytes at one time.

In addition, 0 is not a legal length.

1)ata Tabl	es							
File	Edit Co	onnection Table Rov	v Columi	п					
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		Tables		_					
::: :::	Table 1	Since this Data			Row 0	Column 0 (Integer) 0	Column 1 (Integer) T 0	his cell spans ind 23	s 2 sr)
×		integer, it spans byte 20 and 21			2		0	0	0
					3 Ir 4	0	Integer (22 0)) O O	0 0

Read from Data Table

Below, a MODBUS master reads data tables in Slave ID 1. Bytes 24-43 are read from Slave 1 into bytes 140-159 in the master's data tables.

Parameter	Туре	Function
Slave ID	Constant or MI	The ID of the slave device containing the coils to be read (data source).
Slave: DT Start of Vector	Constant, MI, ML, or DW	The start of the vector of bytes to be read (data source).
Slave: DT Offset in Vector	Constant, MI, ML, or DW	Offset from the Slave: DT Start of Vector
Master: DT Start of Vector	Constant, MI, ML, or DW	This is the start of a vector of bytes that will contain the data read from the slave.
Master: DT Offset	Constant,	Offset from the Master: DT Start of Vector

in Vector	MI, ML, or DW	
Read: DT Vector Length	Constant or MI	The vector length. Note ◆ A MODBUS command cannot read/write more than 242 DT bytes at one time. In addition, 0 is not a legal length.
Status Messages	MI	Shows a message number. To check status and diagnose errors, check the MODBUS Status Messages.
Total Sessions	DW	This is the number of times the master PLC will attempt to access the slave device. Note that this is a simple incremental counter. Initialize it by storing 0 into the selected DW.
Acknowledgements	DW	This is the number of times the slave device answers.

Write to Data Table

Below, a MODBUS master writes to data tables in Slave ID 1. Bytes 140-159 are written from the master into bytes 24-43 in the slave's data tables.

Parameter	Туре	Function
Slave ID	Constant or MI	The ID of the slave device to which the data will be written (data target).
Slave: DT Start of Vector	Constant, MI, ML, or DW	The start of the vector of bytes to be written into (data target).
Slave: DT Offset in Vector	Constant, MI, ML, or DW	Offset from the Slave: DT Start of Vector
Master: DT Start of Vector	Constant, MI, ML, or DW	This is the start of a vector of bytes, in the master, that will contain the data to be written to the slave (data source)
Master: DT Offset	Constant,	Offset from the Master: DT Start of Vector

in Vector	MI, ML, or DW	
Read: DT Vector Length	Constant or MI	The vector length. Note ◆ A MODBUS command cannot read/write more than 242 DT bytes at one time. In addition, 0 is not a legal length.
Status Messages	MI	Shows a message number. To check status and diagnose errors, check the MODBUS Status Messages.
Total Sessions	DW	This is the number of times the master PLC will attempt to access the slave device. Note that this is a simple incremental counter. Initialize it by storing 0 into the selected DW.
Acknowledgements	DW	This is the number of times the slave device answers.

Configuring a MODBUS slave device

The Ladder section below shows what elements are necessary to enable a master device to read from a slave. Note that the MODBUS Scan operation should **not** be performed during the initial program scan.

Note that you must use a condition (RLO) to activate the MODBUS Configuration.

The slave PLC Ladder application must include the elements shown below.

Step 1: Initializing the Ethernet card and configuring MODBUS

Note that all slave devices must be assigned ID number 255.

An activating condition is required, usually Power-up.	B 2 EN ENO PLC NAME Slave PLC	EN TCP CARD	<u>ENO</u> /IP INIT	Sock	et O	EN MOD CO MOD	ENO BUS IP NFIG BUS I Function ir
Ethernet Com Init × Local IP D# - 192.168.192.111 Sub Net Mask. D# - 255.255.255.0			· · · · · · · · · · · · · · · · · · ·	Networ	k ID 1]-	
Gateway D# - 192.168.192.254		MODBL	JS IP C	D# Retr	3 ries		×
The Local IP is the address of the master PLC.		Params	Type D# D#	Add	0 255	Format DEC DEC	Description Socket 0 Network ID 255
		OUT Slaves	MI D# MB		3	DEC	Retries Function in Progress
			BSCHUUU		odless		
		@ Clear	Link	Ok		Can	el Help

Step 2: Scan

To enable the master PLC to access the slave, include a MODBUS Scan FB in the slave's application.

Slave Addressing

Slave Address Tables

Coils		MODBUS Co	mmand Number
Pointer Value From:	Operand type	Read	Write
0000	MB 0-2999	#01 Read Coils	#15 Force Coils

3000	SB	#15 Force Coils
4000	l (read-only)	Read-only
5000	0	#15 Force Coils
6000	T(read-only)	Read-only
7000	C(read-only)	Read-only
8000	MB 3000- 4095	

Note • Note that in order to access MBs 3000-4095, you address as follows: to access MB 3012, request slave address 8012.

Registers			MODBUS	Command Number
Pointer Value From:	Operand type	Register size	Read	Write
0000	МІ	16 bit	# 03 Read Holding Registers	# 16 Preset Holding Registers
4000	SI	16 bit		
5100	ML	32 bit		
6100	SL	32 bit		
6300	MDW	32 bit		
6700	SDW	32 bit		
6900	Timer preset	32 bit		
7200	Timer current	32 bit		
7500	Counter	16 bit		

Examples

The examples below show that:

- MODBUS addressing systems start at 1.
- Vision addressing start at 0.

Bit Operands

<u>Read</u> a 10-bit vector of inputs in a slave Vision controller, starting at Input 20, via Read Coils (MODBUS COMMAND #1)

- Vision PLC as the MODBUS master In VisiLogic's Read Coils FB, set the Slave: Start of Vector parameter to 4020, and the Read: Vector Length parameter to 10. Within the slave Vision controller, VisiLogic will read I 20 - I 29.
- SCADA as the MODBUS master In the SCADA application, set the Slave: Start of Vector parameter to 34021(30001 + 4000 + 20), and the Read: Vector Length to 10, enabling the Master device to read I 20 - I 29 within the slave Vision controller.

<u>Write</u> a 3-bit vector of outputs in a slave Vision controller, starting at Output 8, via Force Coils (MODBUS COMMAND #15)

- Vision PLC as the MODBUS master In VisiLogic's Force Coils FB, set the Slave: Start of Vector parameter to 5008, and the Read: Vector Length parameter to 3. Within the slave Vision controller, VisiLogic will write to O 8 - O 10.
- SCADA as the MODBUS master
 In the SCADA application, set the Slave: Start of Vector parameter to 35009 (30001 + 5000 + 8) and the Read: Vector Length parameter to 3, enabling the Master device to write to O 8 O 10 within the slave Vision controller.

Registers

<u>Read</u> a 9-register long vector of <u>16-bit integers</u> in a slave Vision controller, starting at MI 32, via Read Holding Registers (MODBUS COMMAND #03)

- Vision PLC as the MODBUS master In VisiLogic's Read Holding Registers FB, set the Slave: Start of Vector parameter to 32, and the Read: Vector Length parameter to 9. Within the slave Vision controller, VisiLogic will read MI 32 - MI 41.
- SCADA as the MODBUS master
 In the SCADA application, set the Slave: Start of Vector parameter to 40033 (40001 + 0000 + 3), and the Read: Vector Length parameter to 9, enabling the Master device to read MI 32 MI 41 within the slave Vision controller.

Note If, within the Slave: Start of Vector parameter, the selected register type is

a 32-bit double register (slave addresses 5100 and greater)the preset vector length must be doubled as well.
 If, for example in the VisiLogic Preset Holding Registers FB:

- Slave: Start of Vector parameter is set to 6300, and
- You wish to preset 4 registers, for a total of 16 bytes
- You must set the Preset Vector length to 8.

Note that this means that, in these cases, the Preset: Vector Length parameter will always be an even number.

<u>Read</u> a 9-register long vector of <u>32 -bit integers</u> in a slave Vision controller, starting at SL 32, via Preset Holding Registers (MODBUS COMMAND #16)

- Vision PLC as the MODBUS master In VisiLogic's Preset Holding Registers FB, set the Slave: Preset Vector parameter to 6132, and the Read: Vector Length parameter to <u>18</u> (2x9, in order to fit the 32-bit SL registers). Within the slave Vision controller, VisiLogic will read SL 32 - SL 41.
- SCADA as the MODBUS master In the SCADA application, set the Slave: Start of Vector parameter to 406133, and the Read: Vector Length parameter to <u>18</u>, enabling the Master device to read SL 32 - SL 41 within the slave Vision controller.

Write a 6-register long vector of **<u>16-bit integers</u>** in a slave Vision controller, starting at MI 32, via Preset Holding Registers (MODBUS COMMAND #16)

- Vision PLC as the MODBUS master In VisiLogic's Preset Holding Registers FB, set the Slave: Start of Vector parameter to 32, and the Preset: Vector Length parameter to 6. Within the slave Vision controller, VisiLogic will write to MI 32 - MI 37.
- SCADA as the MODBUS master In the SCADA application, set the Slave: Start of Vector parameter to 40033, and the Read: Vector Length parameter to 6, enabling the Master device to write to MI 32 - MI 37 within the slave Vision controller.

MODBUS Status Operands

All of the Status operands linked to MODBUS FBs should be assigned Power-up Values; bits should be reset, and registers initialized to 0.

MODBUS: Configuration FB Status Operand

All MODBUS operations run through a MODBUS configuration placed in the master device's program.

Function in Progress	ME
Shows status of	
master's MODBUS	
Configuration	
0	

- 3 Turns ON when:
 - A master Vision initiates MODBUS
 - communication. Remains ON during the MODBUS
 - the MODBUS session.

Turns OFF when

- The MODBUS: Configuration is activated.
- An answer is received from a slave.
- The TimeOut defined in the **Configuration** is exceeded.
- Certain Status Messages are given

MODBUS Operation Status Operands When you place MODBUS operations in your application (Force, Read, Preset, and Loopback commands), you link the operands below. These show the status of MODBUS sessions.

Status Shows status of master's data requests and the replies the master	МІ	•	Automatically initialized to 0 when MODBUS operation is activated. Updated at the end of each attempt to communicate via MODBUS.
receives from the slaves		•	Indicates status of MODBUS communications, according to the table below. Note that the current value always shows the most recent status.

<u>#</u>	Status Message		
0	Status OK		
1	Unknown Command Number This is received from the slave device.		
2	 Illegal Data Address Master: an invalid address is found by the master before a data request is sent to a slave. This may result, for example, when an MI is used to provide vector length. Slave: The slave notifies the master that the data request command includes invalid addresses. SlaveScanEX: When ScanEX receives an input parameter in the 32-bit range (for example, 5100{ML}), it automatically takes double-register values. If, for example, ScanEX receives a Read Register(6) request for 5100, it returns the values in 5100 and 5101. If, however, ScanEX receives Read Register(6) request for 5101, it returns Error #2 since 5101 provides the 'high' bytes of the 32-bit register, it is not a legal address. 		
3	 Slave to Master: Illegal Data Type Quantity Number of operands requested by user exceeds the maximum Note ♦ A MODBUS command cannot read more than 124 16-bit integers, 62 double registers, 62 float registers, or 1900 bit operands at one time. In addition, 0 is not a legal vector length. 		
4	MasterTime Out The amount of time the master will attempt to establish a MODBUS session		
5	No Communication The MODBUS session cannot be established.		
 Note ◆ Messages 4 & 5. TimeOut and Number of Retries are defined in the Configuration. A Retry is an attempt to establish a MODBUS session. If, for example, TimeOut is defined as 2 seconds, and number of Retries as 3: the controller will try to establish the session once, and will continue to try for 2 seconds. If the first attempt fails, the Status Message value will be 4, Master TimeOut. The controller will try twice more, for a total of 3 retries over 6 seconds. If all attempts fail, the Status Message value will be 5. If any attempt succeeds, the Status Message will be 0. 			
* 6	Master-slave data incorrectly synchronized		
* 7	Master-slave data incorrectly synchronized		

8	 Master to application: Illegal Data Type Quantity Number of operands requested by user exceeds the maximum permitted for that FB operation in the master. Note ♦ A MODBUS command cannot read more than 124 16-bit integers, 62 double registers, 62 float registers, or 1900 bit operands at one time. In addition, 0 is not a legal vector length.
9	Slave ID Mismatch The Slave ID master sends a command to a slave unit whose IP, as defined in the Configuration, does not match the slaves's index number.
* 11	Master-slave data incorrectly synchronized
* Mess betwee	ages 6, 7, and 11mean that the master has found incompatible elements in the data sent in master and slave.

Total Sessions	DW	 This is the total number of times the master PLC attempts to access the slave device, whether the attempt is successful or not, including Retries. Note that this is a simple incremental counter. This must be initialized by the user, by storing 0 into the selected DW.
Acknowledgements	DW	 This is the number of times the slave device answers. This must be initialized by the user, by storing 0 into the selected DW.

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