STENNER PUMPS®

S SERIES MODBUS RTU
INSTALLATION MANUAL

PERISTALTIC METERING PUMPS SINCE 1957

⚠WARNING

TO BE INSTALLED AND MAINTAINED BY PROPERLY TRAINED PROFESSIONAL INSTALLER ONLY. READ MANUAL & LABELS FOR ALL SAFETY INFORMATION & INSTRUCTIONS.

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IMMB **101719**

WARRANTY AND CUSTOMER SERVICE

LIMITED WARRANTY

Stenner Pump Company will for a period of one (1) year from the date of purchase (proof of purchase required) repair or replace – at our option – all defective parts. Stenner is not responsible for any removal or installation costs. Pump tube assemblies and rubber components are considered perishable and are not covered in this warranty. Pump tube will be replaced each time a pump is in for service, unless otherwise specified. The cost of the pump tube replacement will be the responsibility of the customer. Stenner will incur shipping costs for warranty products shipped from our factory in Jacksonville, Florida. Any tampering with major components, chemical damage, faulty wiring, weather conditions, water damage, power surges, or products not used with reasonable care and maintained in accordance with the instructions will void the warranty. Stenner limits its liability solely to the cost of the original product. We make no other warranty expressed or implied.

RETURNS

Stenner offers a 30-day return policy on factory direct purchases. Except as otherwise provided, no merchandise will be accepted for return after 30 days from purchase. To return merchandise at any time, call Stenner at 800.683.2378 for a Return Merchandise Authorization (RMA) number. A 15% re-stocking fee will be applied. Include a copy of your invoice or packing slip with your return.

DAMAGED OR LOST SHIPMENTS

All truck shipments: Check your order immediately upon arrival. All damage must be noted on the delivery receipt. Call Stenner Customer Service at 800.683.2378 for all shortages and damages within seven (7) days of receipt.

SERVICE & REPAIRS

Before returning a pump for warranty or repair, remove chemical from pump tube by running water through the tube, and then run the pump dry. Following expiration of the warranty period, Stenner Pump Company will clean and overhaul any Stenner metering pump for a minimum labor charge plus necessary replacement parts and shipping. All metering pumps received for overhaul will be restored to their original condition. The customer will be charged for missing parts unless specific instructions are given. To return merchandise for repair, call Stenner at 800.683.2378 or 904.641.1666 for a Return Merchandise Authorization (RMA) number.

DISCLAIMER

The information contained in this manual is not intended for specific application purposes. Stenner Pump Company reserves the right to make changes to prices, products, and specifications at any time without prior notice.

SAFETY INSTRUCTIONS

IMPORTANT SAFETY INSTRUCTIONS

When installing and using this electrical equipment, basic safety precautions should always be followed, including the following:

READ AND FOLLOW ALL INSTRUCTIONS

⚠ **⚠ WARNING** **Warns about hazards that CAN cause death, serious personal injury, or property damage if ignored.**

⚠ **⚠ WARNING** **ELECTRIC SHOCK HAZARD**

⚠ **⚠ WARNING** **RISK OF ELECTRIC SHOCK**

Connect only to a branch circuit protected by a ground-fault circuit-interrupter (GFCI). Contact a qualified electrician if you cannot verify that the receptacle is protected by a GFCI.

⚠ **⚠ AVERTISSEMENT** **RISQUE DE CHOC ELECTRIQUE**

Brancher seulement à un réseau électrique protégé par un DDFT. Contactez un électricien certifié si vous ne pouvez pas vérifier que la prise est protégé par un DDFT.

⚠ **⚠PELIGRO** **PELIGRO DE DESCARGA ELECTRICA**

Conecte a un circuito en derivación protegido por un interruptor de descarga a tierra (GFCI). Contacte a un electricista certificado si no puede verificar que su receptáculo esté protegido por dicho interruptor (GFCI).

ACCESSORIES

1 12" Modbus communication cable

1 Three terminal junction, liquid tight

GENERAL INFORMATION SUMMARY

SUMMARY

The S Series pump is equipped for remote communications using Modbus RTU over RS-485.

The pump will communicate via Modbus RTU in **Manual, 4-20mA, 0-10VDC,** and the **Pulse** modes only.

The pump supports:

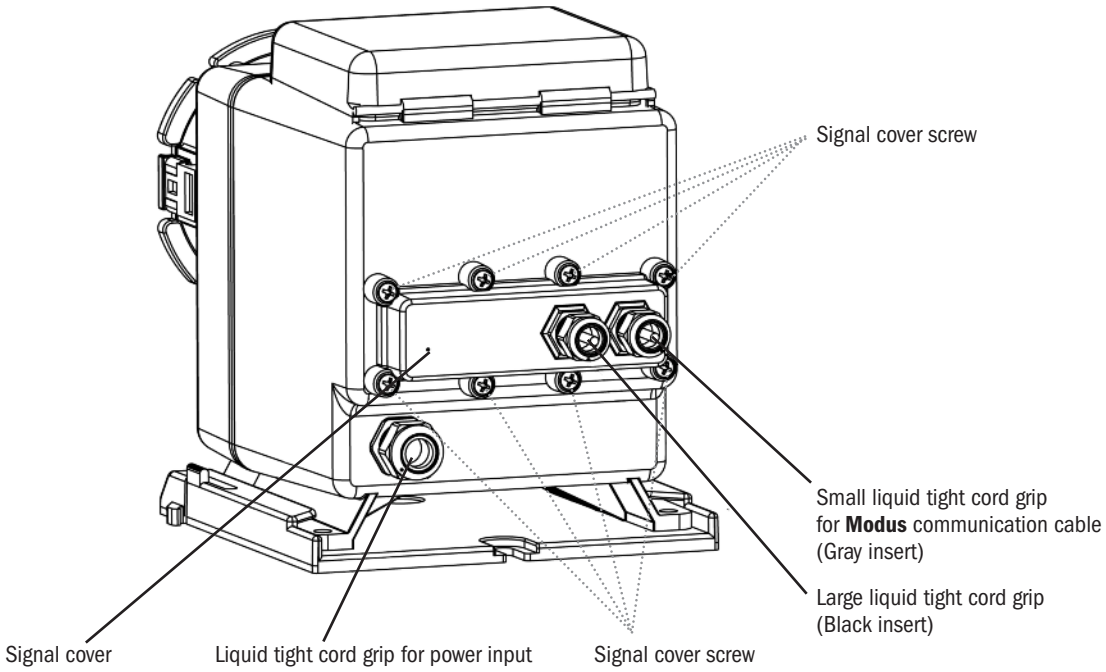
- Programmable slave addresses from 1 to 247
- Baud rates of 9600 or 19200 bps
- Data parities of 8 EVEN 1, 8 Odd 1, 8 None 1, and 8 None 2
- Remote switching between Manual and 4-20mA, 0-10VDC, or Pulse modes
- Setting the speed in Manual mode
- Starting or stopping the pump in the selected mode
- Reading the status of the pump and any alarms

SET UP

GENERAL STEPS TO SET UP MODBUS

1. Connect the pump to the RS-485 bus (refer to pages 8-11).
2. In the Configuration menu, configure the bus communication settings (slave address, baud rate, and data parity) and then enable Modbus (refer to pages 16-17).
3. Use the pump Manual to configure the pump for the appropriate control mode: Manual, 4-20mA, 0-10VDC or Pulse.
4. Place pump in RUN REMOTE (refer to page 18). The pump will now be under system control.

CONNECTIONS



⚠ **⚠ CAUTION** Modbus communication cable entering pump must be UL, cUL AWM Style 2464 approved, shielded, with two 22 AWG conductors. Jacket diameter for small liquid tight must be 0.157" to 0.210".

⚠ **⚠ CAUTION** To reduce risk of electric shock, pull plug before servicing this pump.

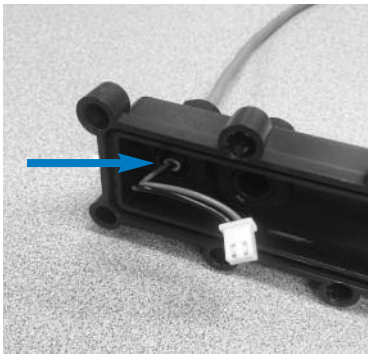
CONNECT MODBUS COMMINICATION CABLE page 1 of 3

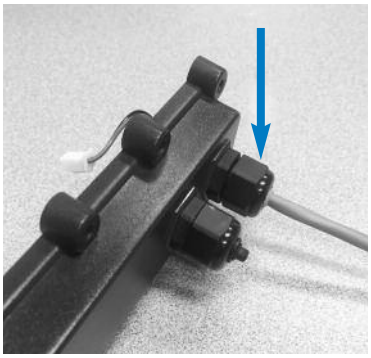
The two pin communication header is located at the rear of the pump. To access it, unplug the pump and remove the signal cover by taking out the eight Phillips head screws that secure it in place.

Loosen the outer nuts on the small liquid tight cord grip. Remove rubber plug from the cord grip.

Insert the Modbus communication cable from the inside of the signal cover, bare end first, through the small cord grip.

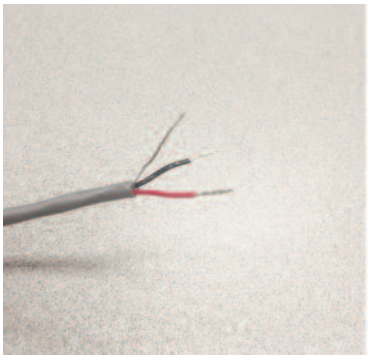
Adjust signal cable so that the outer jacket is flush with the inside of the cord grip. Tighten the cord grip nut flush with the cord grip body as shown below:





On the bare end of the cable, remove 3/4" of the outer jacket. Remove the foil shielding. This will leave a BLACK wire, a RED wire, and a non-insulated shield wire.

Strip the BLACK and RED wire back 3/8" as shown below for the communication cable and for the RS-485 bus wire.



CONNECTIONS continued

CONNECT MODBUS COMMINICATION CABLE page 2 of 3

Disassemble the liquid tight junction box provided.

Slide a compression nut and a connector cover onto the communication cable and the RS-485 bus wire.

Install and secure the RED, BLACK, and SHIELD wires into the three terminals on one side of the connector body by loosening the screws, twisting and inserting the wire, and then tightening the screws.

NOTE: The RED wire is the RS-485 “T/R+” and the BLACK wire is the RS-485 “T/R-”

Install and secure the RS-485 bus wire to the other side of the connector.

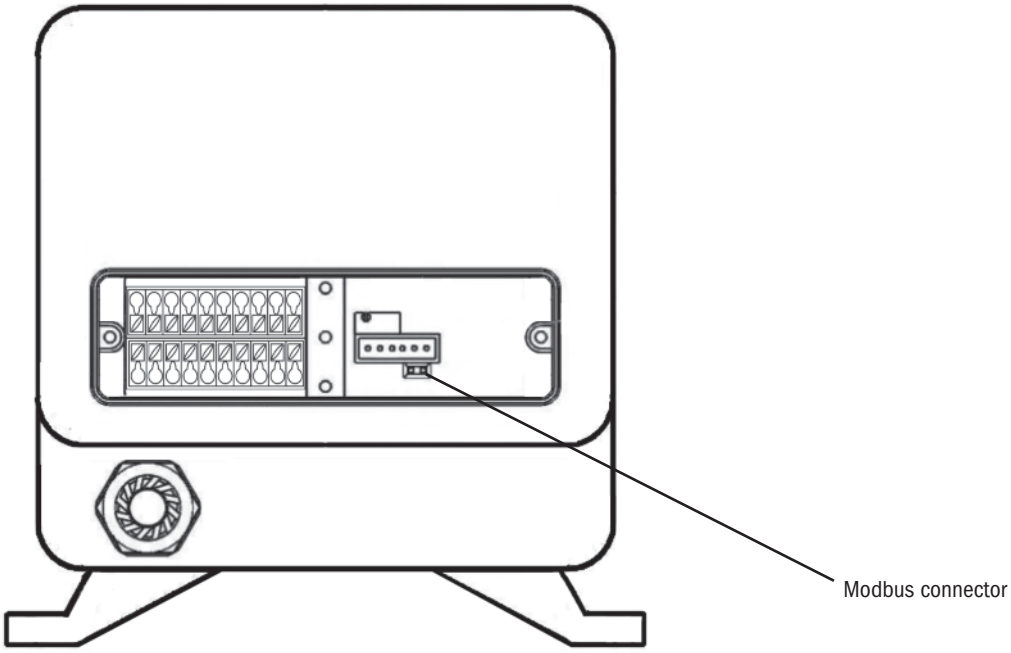
Tighten the connector covers onto the connector body. Connector covers should be finger tight.

Tighten the compression nuts onto the connector covers. The compression nut should be tightened until it is flush with the connector body.

CONNECTIONS continued

CONNECT MODBUS COMMINICATION CABLE page 3 of 3

Install the Modbus communication cable by connecting it to the two pin communication header as shown. Note that the RED (T/R+) line should be on the left side of the communication header. If present, please remove the jumper on these pins and discard.



Replace signal cover, ensuring that the signal wires do not get pinched between the signal cover and pump body.

Replace the signal cover screws, using care to find existing threads, and tighten until the signal cover is evenly and fully tightened down flush.

⚠ **⚠ WARNING** Failure to properly tighten or secure the cord grip or signal cover may allow water to enter the pump enclosure, which can cause pump failure, property damage, or personal injury.

CONFIGURATION MENU

SUMMARY

Configure the pump parameters. Configuration should be completed at the initial set up.

NAVIGATION

▲

Moves up in a menu, toggles between options, or increase a value

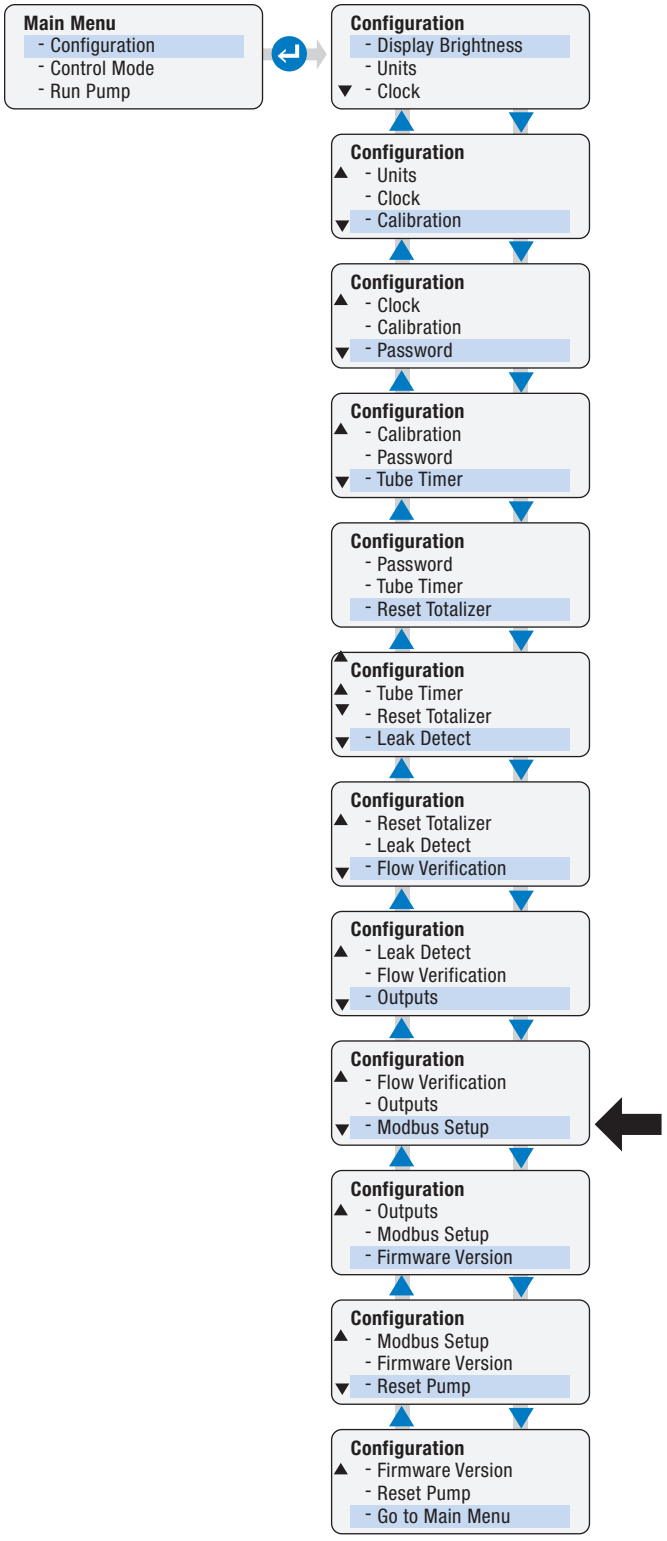
▼

Moves down in a menu, toggles between options, or decreases a value

Holding the ▲ or ▼ button causes the numbers to change rapidly.

Moves one step back in a menu, when permitted

Sets a value in a menu



CONFIGURATION MENU continued

MODBUS SETUP MENU

Use this menus to set the pump slave address,baud rate,data parity, and enable or disable Modbus.

NAVIGATION

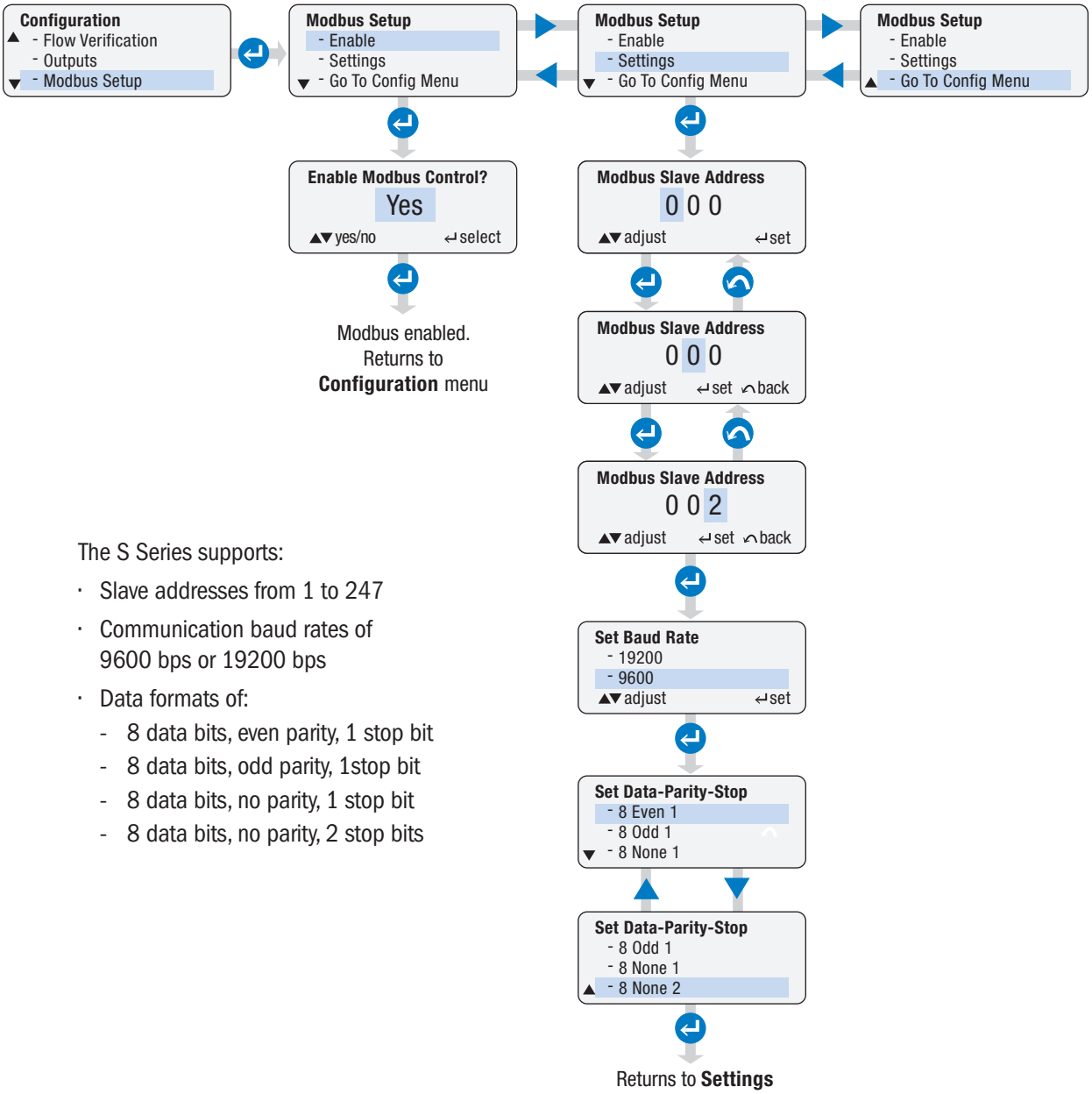
▲ Moves up in a menu, toggles between options, or increase a value

▼ Moves down in a menu, toggles between options, or decreases a value

Holding the ▲ or ▼ button causes the numbers to change rapidly.

↶ Moves one step back in a menu, when permitted

↵ Sets a value in a menu



The S Series supports:

- Slave addresses from 1 to 247
- Communication baud rates of 9600 bps or 19200 bps
- Data formats of:
  - 8 data bits, even parity, 1 stop bit
  - 8 data bits, odd parity, 1stop bit
  - 8 data bits, no parity, 1 stop bit
  - 8 data bits, no parity, 2 stop bits

MAIN MENU

RUN PUMP

This menu allows the user to run the pump in remote (**Manual, 4-20mA, 0-10VDC,** or **Pulse** modes) or locally (**Manual** mode only).

⚠ **⚠ WARNING** Always take pump out of Modbus control by running it in Local mode or by disabling Modbus in the **Modbus Setup** menu (under the **Configuration** menu) when working on the pump or doing maintenance on the pump to prevent injuries from the pump being remotely started.

Placing the pump under Modbus control (RUN REMOTE):
To place the pump under remote control after Modbus has been set and enabled in the **Configuration** menu and after the **Manual, 4-20mA, 0-10VDC,** or **Pulse** mode has been set in the **Control Mode** menu, follow the menu map on the following page to **Run Pump? Yes (Remote).** After pressing **Enter,** the pump will be in remote control via Modbus. The pump will be stopped (as indicated by **"rmt Stop"** in the display. It will remain stopped until it receives instructions from via Modbus.

Placing the pump under local control (RUN LOCAL):
To place the pump under local control after Modbus has been set and enabled in the **Configuration** menu and after the **Manua**l mode has been set in the **Control Mode** menu, follow the menu map on the following page to **Run Pump? Yes (Local).** After pressing **Enter,** the pump will start running in **Manual** mode under local control. The pump will then operate in accordance to the **Manual** mode as described in the pump IOM. The advantage of running the pump in local mode for maintenance, such as tube changes, is that the pump status can still be monitored via Modbus. This allows a system or remote operator to determine that the pump has been taken out of remote, whether it is running or not, and what speed it is running, in addition to any fault or alarm conditions.

Exiting Local or Remote modes:
Exiting local or remote run modes is done in a way that is similar to what is described in the IOM for non- Modbus modes. From the operating display, hold down the **Enter** button for two seconds. The unit will stop running and the display will show a notification that the "Pump will be removed from Modbus control", which must be accepted by pressing **Enter.** If a password has been set, the user will have to enter the password. Once this has been completed, the user will be at the top of the **Main** menu.

MAIN MENU continued

NAVIGATION

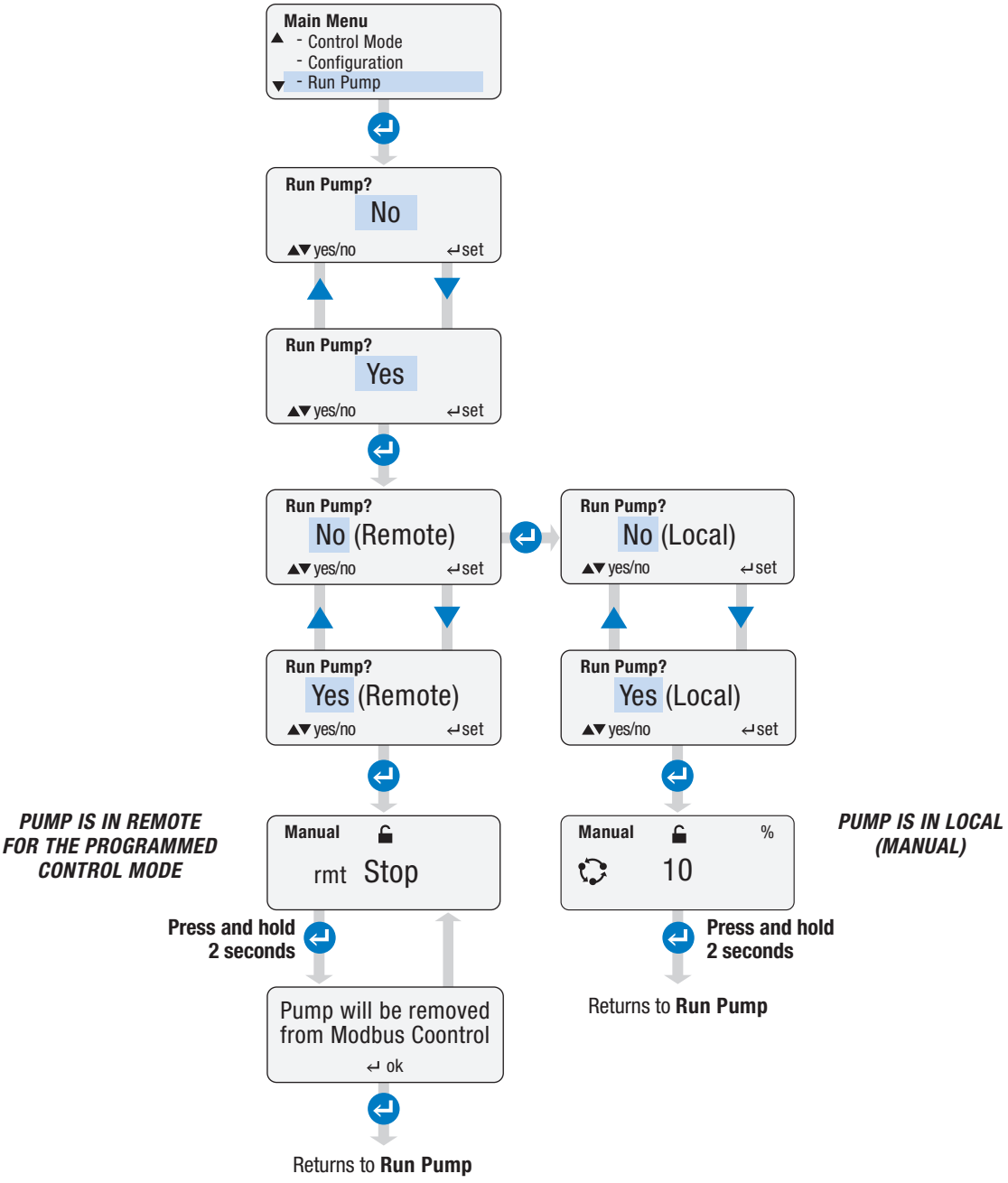
▲ Moves up in a menu, toggles between options, or increase a value

▼ Moves down in a menu, toggles between options, or decreases a value

Moves one step back in a menu, when permitted

Sets a value in a menu

Holding the ▲ or ▼ button causes the numbers to change rapidly.



⚠ **⚠ WARNING** Always take pump out of Modbus control by running it in the Local mode or by disabling Modbus in the **Modbus Setup** menu (under the **Configuration** menu) when working on the pump or doing maintenance on the pump to prevent injuries from the pump being remotely started.

OPERATION

MODBUS COMMUNICATION

Once in remote, the pump is controlled via Modbus. Below is a typical Modbus protocol instruction:

02	06	0000	0001	4839
Slave Address	**Function Code**	**Register Adddress**	**Register Value**	**CRC**

Refer to the table on the following page for details on supported registers, addresses, functions, etc.

REGISTER NUMBER	REGISTER ADDRESS (2 BYTES)	DESCRIPTION	READ/WRITE	REGISTER VALUE RANGE (2 BYTES)	DATA SIZE (1 BYTE)	FUNCTION CODE
4x0001	0x0000	Start Pump, Stop Pump, Reset Faults	Write Only	0x0000 to 0x0002	16 bits	6
4x0002	0x0001	Change Pump Mode	Write Only	0x0001 to 0x0004	16 bits	6
4x0003	0x0002	Set Manual Mode Speed	Write Only	0x0000 to 0x0064	16 bits	6
4x0004	0x0003	Request Pump Speed	Read Only	0x0001	16 bits	3
4x0005	0x0004	Request Tube Time	Read Only	0x0001	16 bits	3
4x0006	0x0005	Request Pump Status	Read Only	0x0001	16 bits	3

	COMMENTS		
	Write 0x0000 to **STOP** pumpWrite 0x0001 to **START** pump Write 0x0002 to **RESET** faults (tube timer, leak detect, flow verification) Note: **Drive Fault** error requires cycling of pump power to reset.		
	Write 0x0001 to put pump in **MANUAL** mode Write 0x0003 to put pump in **0-10VDC** mode	Write 0x0002 to put pump in **4-20mA** mode Write 0x0004 to put pump in **Pulse** mode	
	0x0000 to 0x0064 maps to 0 to 100% speed in one percent increments For example: Writing 0x0000 sets speed at 0%	Writing 0x0032 sets speed at 50%	Writing 0x0064 sets speed at 100%
	Returns a value from 0x000 to 0x0064 that maps to 0 to 100%		
	Returns a value from 0x000 to 0x270F that maps to 0 to 9999 hours		
	Returns a value that corresponds to the following status bits:		
	Bit 0:	REMOTE	A value of 1 indicates that the pump is in **REMOTE** control via Modbus. A value of 0 indicates that the pump is in **LOCAL** control.
	Bit 1:	RUN	**Remote:** A value of 1 indicates that the pump has been sent a START command. Speed must be checked to determine if the pump is running. For example, the pump could be in 4-20mA mode while receiving a signal of 4mA. It has been sent the START command, but the pump will not actually be running if 4mA = 0% speed. **Local:** A value of 1 indicates that the pump is running. A value of 0 indicates that the pump is not running.
	Bit 2:	STANDBY	A value of 1 indicates that **STANDBY** is activated.
	Bit 3:	DRIVE FAULT	A value of 1 indicates that the pump is in **Drive Fault.** This must be reset by cycling power to the pump.
	Bit 4:	TUBE TIMER	A value of 1 indicates that **Tube Timer** has expired. This fault can be reset remotely; however, the fault will return if the condition has not been cleared at the pump. In this case, the tube should be changed, and the tube timer should be reset.
	Bit 5:	FLOW DETECT	A value of 1 indicates that **Flow Verifiation** has detected a loss of flow. This fault can be reset remotely; however, the pump should be physically checked first to ensure that any issues that could cause the loss of flow have been addressed, such as a clogged discharge, empty solution tank, disconnected discharge tube, etc.
	Bit 6:	LOW SIGNAL	A value of 1 indicates a **LOW SIGNAL** fault in the 4-20mA or 0-10VDC mode. This fault is will self-reset when the signal returns to a value above the low signal setpoint.
	Bit 7:	HIGH SIGNAL	A value of 1 indicates a **HIGH SIGNAL** fault in the 4-20mA or 0-10VDC mode. This fault is will self-reset when the signal returns to a value above the low signal setpoint.
	Bit 8:	RESERVED	Reserved for future use.
	Bit 9:	RESERVED	Reserved for future use.
	Bit 10:	SIGNAL OVERRUN	A value of 1 indicates an **OVERRUN** fault in the PULSE mode. This fault will self-reset when there is no longer a pulse signal present during a run.
	Bit 11:	TRANSFER	A value of 1 indicates that a **LEAK DETECT, FLOW VERIFICATION,** or **DRIVE FAULT** error has occurred. If a relay has been programmed for **TRANSFER,** the relay will be activated.
	Bit 12:	TUBE LEAK	A value of 1 indicates that a **TUBE LEAK** has been detected. This fault can be reset remotely; however, the pump should be physically checked first to ensure that the cause of the lead detect fault has ben addressed (tube has been changed).
	Bit 13:	RESERVED	Reserved for future use.
	Bit 14:	RESERVED	Reserved for future use.
	Bit 15:	RESERVED	Reserved for future use.

OPERATING MODE

DISPLAYS

After selecting **RUN PUMP** in **REMOTE** from the Main Menu and pressing ENTER, the pump will go into **REMOTE** and will be controlled via Modbus based on the programmed settings.

REMOTE operating mode will be indicated by "rmt" on the display screen (as shown above). When entering the **REMOTE** operating mode, the pump will come up in **STOP.**
Further control of the pump must be done via Modbus.

NOTE:

- If a password is set, the pump controls will lock out after 60 seconds of no keypad activity.
- To unlock the pump, press **ENTER** for approximately 2 seconds (see instructions on page 15).
- When in **REMOTE,** the **PRIME** and **OFF** buttons are not functional. Pressing the **BACK** button allows the user to scroll through the different display options available for the operating mode (see pump IOM).

TROUBLESHOOTING – PUMP HEAD

PROBLEM	POSSIBLE CAUSE	SOLUTION
Pump does not respond to Modbus	Incorrect signal connection	Try reversing wires from RS-485 bus
	Pump is not in Remote	Program the pump for the desired mode and place in Run Remote
	Incorrect communication settings	Check slave address, baud rate, and data settings

STENNER PUMPS

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