

TPR3E-Plus with RS485

1. Description

The TPR3E-Plus with RS485 option uses serial communication allowing it to communicate over long distances with a computer or other types of instruments. It uses a two wire system and does not need additional communication lines.

When used with a computer, the maximum length of communication wire is 1.2km (4600 ft). In addition, to increase communication reliability, the communication line of the system can be connected in a ring shape.

- 1) Communication method: HDX (half duplex) RS485
- 2) Maximum distance: 1.2km (4600ft)
- 3) Maximum number of connections: 31 / port
- 4) Communication data: 1 START, 8 DATA, 1 STOP Bit, NO PARITY
- 5) Speed: Selectable 2400, 4800, 9600 BPS
- 6) Protocol: MODBUS® ASCII

2. TPR3E-Plus Communication number and speed set up

Prior to using the RS485 feature, the address and communication speed need to be set up.

- 1) Apply power to the TPR3E-Plus and go to parameter group 6 (communication). Refer to the TPR3E-Plus user manual for instructions on changing parameter groups.
- 2) Set up the address (AddS) and speed (SPEd) of the TPR3E-Plus communication.

NOTE 1: Set the speed parameter (SPEd) to 2400 for communication speed of 2400 BPS
 Set the speed parameter (SPEd) to 4800 for communication speed of 4800 BPS
 Set the speed parameter (SPEd) to 9600 for communication speed of 9600 BPS

NOTE 2: Set the address parameter (AddS) to give the TPR3E-Plus a communication number. Setting the AddS parameter to 0 disables communication.

NOTE 3: See the TPR3E-Plus user manual for details on how to use the controller.

WARNING: Every TPR3E-Plus controller connected to the communication line must have the same speed and each controller must have a different communication number to operate properly.

3. Connecting Communication Wire

When making the communication connection observe the correct polarity. When the distance between a computer and TPR3E-Plus is short (i.e. less than 10m or 33 feet) a twisted pair of wires can be used. Shielded wire should be used for longer distances.

For optimum performance the communication line must use matching resistance. To accomplish this there is a jumper on the inside of the controller. This jumper is set to the **%M+** position from the factory and should be left in this position if only one controller is being used. If more than one controller is used, only the final controller should have the jumper set to **%M+**. All other controllers should have the jumper set to the other position.

Referring to the following figures, connect the matching resistor of the final controller by putting the jumper in **%M+** location on the PC board of TPR3E-Plus controller.

Make all other connections as outlined in the TPR3E-Plus user manual.

WARNING: The last TPR3E-Plus in the communication line must have the jumper set to **%M+**. When TPR3E-Plus are added or removed, the jumper position should be checked to ensure correct connection.

4. Reading internal variable data of the TPR3E-Plus (MODBUS® Function Code 03)

Function code 03 is used to request variable data from the TPR3E-Plus via a computer or an external instrument. The procedure to receive data is as follows.

NOTE: Refer to general MODBUS® communication rules for detailed Check-Sum method, response time, and definitions of other function codes.

- 1) In the following example the data of the **%soft start time+variable** is requested from the TPR3E-Plus with an **AddS** number of 01. When requesting data from the TPR3E-Plus using a computer the request is formatted as follows:

- (1) Start bit: (:)
- (2) TPR3E-Plus address (**AddS**) number: (01 . 31)
- (3) MODBUS® function code: (03)
- (4) Four digit address of data: 0003 (See the Tables Starting at 7.1)
- (5) Amount of data requested: 0001 (# of bytes in four digits)
- (6) CHECK-SUM HIGH: (C1)
- (7) CHECK-SUM LOW: (C2)
- (8) Carriage return: (CR)
- (9) Line feed: (LF)

e.g.: The above data would look like this: :010300030001 C1, C2, CR, LF

- 2) The response of the TPR3E-Plus to the request is formatted as follows:

- (1) Start bit: (:)
- (2) TPR3E-Plus address (**AddS**) number: (01 . 31)
- (3) Repeat of the MODBUS® function Code: (03)
- (4) Number of responding bytes: (0001)
- (5) Value of data requested: 000A (2 bytes in HEX code)
- (6) CHECK-SUM HIGH: (C1)
- (7) CHECK-SUM LOW: (C2)
- (8) Carriage return: (CR)
- (9) Line feed: (LF)

e.g.: The response would look like this: 010302000A and C1,C2,CR, LF
The response indicates the soft start time is 10 seconds (000A HEX).

5. Changing Data in the TPR3E-Plus (MODBUS® Function Code 06)

Function code 06 is used to change the data of variables in the TPR3E-Plus via a computer or external instrument. The procedure to change data is as follows.

NOTE: Refer to general MODBUS® communication rules for detailed Check-Sum method, response time, and definitions of other function codes.

- 1) In the following example the data contained in the TPR3E-Plus data address number 3 (integral time) will be changed to 15 seconds (HEX 000F).

- (1) Start bit: (:)
- (2) TPR3E-Plus Address (AddS) Number: (01 . 31)
- (3) MODBUS® Function Code: (06)
- (4) Address of data to be changed: (0003)
- (5) New data: (000F) (HEX for 15)
- (6) CHECK-SUM HIGH: (C1)
- (7) CHECK-SUM LOW: (C2)
- (8) Carriage return: (CR)
- (9) Line feed: (LF)

e.g.: The above data being transmitted to the TPR3E-Plus would look like this :01060003000F C1, C2, CR, LF and the soft start time would be changed to 15 seconds (000F).

6. TPR3E-Plus response after data change

- 1) If the data change was completed properly the TPR3E-Plus will respond by sending back the original request.
- 2) If the data transfer was not completed properly the TPR3E-Plus will respond with the following message.

- (1) Start bit: (:)
- (2) TPR3E-Plus address (AddS) number: (1 . 31)
- (3) MODBUS® function code: (86)
- (4) Data failure code: (02)
- (5) CHECK-SUM HIGH: (C1)
- (6) CHECK-SUM LOW: (C2)
- (7) Carriage return: (CR)
- (8) Line feed: (LF)

e.g.: For example if the integral time change was not completed properly or if the soft start time is too low the response from the TPR3E-Plus would look like this: :018602 C1,C2,CR, LF

8. TPR3E-Plus Parameter Addresses and Functions

The following tables contain all of the TPR3E-Plus parameters. The table lists their address numbers and functions.

The tables are set up as follows:

- 1) Parameter address: The addresses are in hexadecimal code.
- 2) Symbol: The parameter symbol as shown on the TPR3E-Plus display.

- 3) Parameter adjustment range: The minimum and maximum allowable limits for the given parameter.
- 4) Parameter function: Description of the variable.
- 5) All parameters are in integer form only. All numbers after the decimal point will be removed.
- 6) Parameters are classified into groups by functions.

NOTE: Refer to the TPR3E-Plus manual for details on parameter functions and adjustment ranges.

Table 7)TPR3E-Plus Parameter table for RS 485 MODBUS ASCII

Add.	sign	Function	Set & Range	Read/Write
0	PAS	Password	For parameter set	R
1	Out	Output high limit	0 - 100%	R/W
2	CLm	Current high limit	5 - 240A	R/W
3	SSt	Soft start time	0 - 250초	R/W
4	Cmd	Action when over current	0(ALm), 1(OFF), 2(Cnt)	R/W
5	Pmd	Action when input power fail	0(ALm), 1(OFF)	R/W
6	tmd	Action when over temp.	0(ALm), 1(OFF)	R/W
7	FLt	Input filter	0 - 10 초	R/W
8	LbA	Wait time for load brake	0 - 254초	R/W
9	bUZ	Internal buzzer	0(Off), 1(On)	R/W
10	---	Set output	0 - 100%	R/W
11	Smd	Select setting mode	0(Ana), 1(COm)	R/W
12	AdS	Address	1 - 31	R
13	SPd	Speed	0(2400),1(4800),2(9600)	R
14	Cdy	Delay	1 - 4	R
15	---	Select display	0(Input), 1(R), 2(T)	R
23	---	Alarm sign		R
24	---	Analog(4-20mA) input	-8 - 108%	R
25	---	Line current #1	0 - 250A	R
26	---	Line current #2	0 - 250A	R
27	---	Output limit(VR)	0 - 100%	R
28	---	SCR Temp.	0 - 80℃	R