

Topic: AH/AS Series Socket Communication Instructions

Supported Models	AH / AS Series
Keywords	Socket, TCP, UDP, SSOPEN, SSEND, SREVD, SCLOSE

Content

1. Introduction and Purpose.....	3
2. AH Series- List of Ethernet Instructions (Socket).....	4
2.1 AH Series- Explanation of Ethernet Instructions (Socket).....	4
3. Examples of AH Series.....	14
3.1 AH Series Example 1: TCP Sample Program (S3: 1 as Client/PC as Server).....	16
3.2 AH Series Example 2: TCP Sample Program (S3: 0 as Server/PC as Client).....	20
3.3 AH Series Example 3: UDP Sample Program.....	23
4. AS Series- List of Ethernet Instructions (Socket).....	27
4.1 AS Series- Explanation of Ethernet Instructions (Socket).....	28
5. Examples of AS Series.....	36
5.1 AS Series Example 1: TCP Sample Program (S3: 1 assign PLC as Client/PC as Server).....	37
5.2 AS Series Example 2: TCP Sample Program (S3: 0 as Server/PC as Client).....	40
5.3 AS Series Example 3: UDP Sample Program.....	42
5.4 AS Series Example 4: SCONF Sample Program.....	45

1. Introduction and Purpose

Introduction:

The examples in this document contains information to help familiarize the use of socket instruction settings and corresponding operation regarding AH500 and AS300 Series.

Purpose:

Allows first-time users to familiarize with socket instructions and be able to use it.

2. AH Series- List of Ethernet Instructions (Socket)

API	Instruction Code (bit)		Pulse Instruction	Function	STEPS
	16	32			
2200	SOPEN	–	✓	Opening a socket	7
2201	SEND	–	✓	Sending data via a socket	5
2202	SRCVD	–	✓	Receiving data via a socket	5
2203	SCLOSE	–	✓	Closing a socket	5

2.1 AH Series- Explanation of Ethernet Instructions (Socket)

API	Instruction code			Operand	Function
2200	SOPEN	P		S₁, S₂, S₃	Opening a socket

Device	X	Y	M	S	T	C	HC	D	L	SM	SR	E	PR	K	16#	“\$”	DF
S₁	●	●			●	●		●	●			○	●	○	○		
S₂	●	●			●	●		●	●			○	●	○	○		
S₃	●	●			●	●		●	●			○	●	○	○		

Pulse Instruction	16-bit Instruction (7 steps)	32-bit Instruction
AH500	AH500	-

Symbol:

SOPEN		SOPENP			
En		En		S₁	: Socket mode Word
S1		S1		S₂	: Socket number Word
S2		S2			
S3		S3		S₃	: Start mode Word

Explanation:

- S₁** is 1 if users want to open the TCP socket, and **S₁** is 0 if users want to open the UDP socket. **S₂** is the socket number. The AH500 series PLC as the client sends the TCP connection request to the server if **S₃** is 1, and the AH500 series PLC as the sever waits for the TCP connection request from the client if **S₃** is 0. If users want to start the UDP connection, **S₃** can be 0 or 1.
- The operand **S₁** should be either 0 or 1; the operand **S₂** should be within the range between 1 and 8; the operand **S₃** should be either 0 or 1.
- Before using the instruction, complete the following HWCONFIG setting in ISPSoft or use MOV instruction to send related data on sockets to the corresponding special data registers.
 - PLC Parameter Setting→Ethernet-Basic→Setting the IP address and the netmask address
 - PLC Parameter Setting→Ethernet-Advanced→Socket→Enable Socket Function
 - PLC Parameter Setting→Ethernet-Advanced→Socket→TCP/UDP Socket Connection→ Setting the sockets which are used.
- Use sockets which uses the TCP protocol to setup corresponding registers. The values in all registers can be altered except that the transmitted data counter and the received data counter are read-only.

Item \ Socket Number	1	2	3	4	5	6	7	8
Local communication port	SR1118	SR1131	SR1144	SR1157	SR1170	SR1183	SR1196	SR1209
Remote IP address (high word)	SR1119	SR1132	SR1145	SR1158	SR1171	SR1184	SR1197	SR1210
Remote IP address (low word)	SR1120	SR1133	SR1146	SR1159	SR1172	SR1185	SR1198	SR1211
Remote communication port	SR1121	SR1134	SR1147	SR1160	SR1173	SR1186	SR1199	SR1212
Transmitted data length	SR1122	SR1135	SR1148	SR1161	SR1174	SR1187	SR1200	SR1213
Transmitted data address (high word)	SR1123	SR1136	SR1149	SR1162	SR1175	SR1188	SR1201	SR1214
Transmitted data address (low word)	SR1124	SR1137	SR1150	SR1163	SR1176	SR1189	SR1202	SR1215
Received data length	SR1125	SR1138	SR1151	SR1164	SR1177	SR1190	SR1203	SR1216
Received data address (high word)	SR1126	SR1139	SR1152	SR1165	SR1178	SR1191	SR1204	SR1217
Received data address (low word)	SR1127	SR1140	SR1153	SR1166	SR1179	SR1192	SR1205	SR1218
Persistent connection time (sec)	SR1128	SR1141	SR1154	SR1167	SR1180	SR1193	SR1206	SR1219
Received data counter	SR1129	SR1142	SR1155	SR1168	SR1181	SR1194	SR1207	SR1220
Transmitted data counter	SR1130	SR1143	SR1156	SR1169	SR1182	SR1195	SR1208	SR1221

- If the value of persistent connection time is set 0, the connection will not be on hold and no timeout.
- Use sockets which uses the UDP protocol to setup corresponding registers. The values in all registers can be altered except that the transmitted data counter and the received data counter are read-only.

Item \ Socket Number	1	2	3	4	5	6	7	8
Local communication port	SR1222	SR1234	SR1246	SR1258	SR1270	SR1282	SR1294	SR1306
Remote IP address (high word)	SR1223	SR1235	SR1247	SR1259	SR1271	SR1283	SR1295	SR1307
Remote IP address (low word)	SR1224	SR1236	SR1248	SR1260	SR1272	SR1284	SR1296	SR1308
Remote communication port	SR1225	SR1237	SR1249	SR1261	SR1273	SR1285	SR1297	SR1309
Transmitted data length	SR1226	SR1238	SR1250	SR1262	SR1274	SR1286	SR1298	SR1310
Transmitted data address (high word)	SR1227	SR1239	SR1251	SR1263	SR1275	SR1287	SR1299	SR1311
Transmitted data address (low word)	SR1228	SR1240	SR1252	SR1264	SR1276	SR1288	SR1300	SR1312

Item \ Socket Number	1	2	3	4	5	6	7	8
Received data length	SR1229	SR1241	SR1253	SR1265	SR1277	SR1289	SR1301	SR1313
Received data address (high word)	SR1230	SR1242	SR1254	SR1266	SR1278	SR1290	SR1302	SR1314
Received data address (low word)	SR1231	SR1243	SR1255	SR1267	SR1279	SR1291	SR1303	SR1315
Received data counter	SR1232	SR1244	SR1256	SR1268	SR1280	SR1292	SR1304	SR1316
Transmitted data counter	SR1233	SR1245	SR1257	SR1269	SR1281	SR1293	SR1305	SR1317

7. When opening the TCP socket, the remote IP address and communication port settings are shown below.

Remote IP address	Local communication port	Remote communication port	Description
0.0.0.0	0	0	Illegal
0.0.0.0	Not equal to 0	0	Only applies to the server 1. Accepts the connection request from the same local communication port. 2. Receives packet sent from any device via local communication port. 3. Data cannot be sent.
0.0.0.0	0	Not equal to 0	Illegal
Specific IP Address	0	0	Illegal
Specific IP Address	Not equal to 0	0	Only applies to the server 1. Receives packets sent from specific IP address via local communication port.
Specific IP Address	0	Not equal to 0	Only applies to the client 1. When connecting, the system specifies an unused communication port as the local communication port. 2. Sending data to specific IP address via remote communication port.
Specific IP Address	Not equal to 0	Not equal to 0	1. Accepts requests for local communication port, remote communication port and specific IP address connection setups. 2. Sending data to the specific IP address via remote communication port for execution. 3. Receives packets sent from specific IP address via local communication port.

8. When the TCP socket is opened, and no error occurs after the instruction is executed, the PLC is connected to the remote device, and the flag related to successful connection is ON, while start connection flag is OFF. When executing SSEND instruction to send PLC data, the flag for sending data is ON and once sending is complete, the flag for data sent is ON. When executing SRCVD instruction to receive data, the flag for receiving data is ON and once receiving is complete, the flag for data received is ON. When executing SCLOSED instruction to close socket connection, the flag for closing connection is ON and successful connection is OFF. If an error occur, the corresponding error flag is ON.

TCP socket number	Successful connection flag	Data received flag	Data sent flag	Starting connection flag	Closing connection Flag	Sending data flag	Receiving data flag	Error flag
1	SM1270	SM1271	SM1272	SM1273	SM1274	SM1275	SM1276	SM1277
2	SM1278	SM1279	SM1280	SM1281	SM1282	SM1283	SM1284	SM1285
3	SM1286	SM1287	SM1288	SM1289	SM1290	SM1291	SM1292	SM1293
4	SM1294	SM1295	SM1296	SM1297	SM1298	SM1299	SM1300	SM1301
5	SM1302	SM1303	SM1304	SM1305	SM1306	SM1307	SM1308	SM1309
6	SM1310	SM1311	SM1312	SM1313	SM1314	SM1315	SM1316	SM1317
7	SM1318	SM1319	SM1320	SM1321	SM1322	SM1323	SM1324	SM1325
8	SM1326	SM1327	SM1328	SM1329	SM1330	SM1331	SM1332	SM1333

9. When the UDP socket is opened, and no error occurs after the instruction is executed, the flag for successful connection is ON. When executing SSEND instruction to send PLC data, the flag for sending data is ON and once sending is complete, the flag for data sent is ON. When executing SRCVD instruction to receive data, the flag for receiving data is ON and once receiving is complete, the flag for data received is ON. When executing SCLOSED instruction to close socket connection, the flag for closing connection is ON and successful connection is OFF. If an error occur, the corresponding error flag is ON.

UDP Socket	Starting connection flag	Data received flag	Sending data flag	Receiving data flag	Error flag
1	SM1334	SM1335	SM1336	SM1337	SM1338
2	SM1339	SM1340	SM1341	SM1342	SM1343
3	SM1344	SM1345	SM1346	SM1347	SM1348
4	SM1349	SM1350	SM1351	SM1352	SM1353
5	SM1354	SM1355	SM1356	SM1357	SM1358
6	SM1359	SM1360	SM1361	SM1362	SM1363
7	SM1364	SM1365	SM1366	SM1367	SM1368
8	SM1369	SM1370	SM1371	SM1372	SM1373

10. In general, the SOPENP pulse instruction is used.

Additional remarks:

1. If **S₁**, **S₂**, or **S₃** exceeds the range, the instruction is not executed, SM0 is ON, and the error code in SR0 is 16#2003.
2. When the AH series PLC is the client that opens TCP connection, an error occurs if the number of servers which can be connected reaches the upper limit, the corresponding error flag is ON, the error code is 16#600A and the instruction is not executed.
3. When the AH series PLC is the client that opens TCP connection, an error occurs if the server communication port number is 0, the corresponding error flag is ON, the error code is 16#6202 and the instruction is not executed.
4. When starting UDP connection, an error occurs if the number of servers that can be connected reaches the upper limit or a connection already exists, the corresponding error flag is ON, the error code is 16#600B and the instruction is not executed.
5. When the AH series PLC is the server that opens a communication port for TCP connection, an error occurs if the local communication port is already used, the corresponding error flag is ON, the error code is 16#600C; if the local communication port is 0, the corresponding error flag is ON, the error code is 16#6201 and the instruction is not executed.
6. When opening UDP connection, an error occurs if the local communication port is already used, the corresponding error flag is ON, the error code is 16#600C and the instruction is not executed.

7. When opening TCP connection, an error occurs if the value in the high word of the remote IP address is 0, 127 or the value is larger than 223, the corresponding error flag is ON, the error code is 16#6200, and the instruction is not executed.
8. When opening UDP connection, an error occurs if the value in the high word of the remote IP address is 0, 127 or the value is larger than 223, the corresponding error flag is ON, the error code is 16#6209 and the instruction is not executed.
9. When initiating UDP connection, an error occurs if the local communication port and the remote communication port are both 0, the corresponding error flag is ON, the error code is 16#620A and the instruction is not executed.
10. When opening TCP connection, an error occurs if the socket has been connected or is connecting, the corresponding error flag is ON, the error code is 16#6217; when closing connection, an error occurs and the corresponding error flag is ON, the error code is 116#621A and the instruction is not executed.
11. During the connection, an error occurs if the other host abandons the connection, the corresponding error flag is ON, the error code is 16#6214; if the other host has a response timeout, the corresponding error flag is ON, the error code is 16#6212 and the instruction is not executed.
12. When the AH series PLC is used as client and server and share the same timeout values; if a timeout occurs for the server first, the connection will be automatically cut off, so the client will not receive an error flag. On the contrary, if the client connection suffers a timeout first, then the client will receive an error flag and the connection is cut off.

API	Instruction Code			Operand						Function				
2201		SSEND	P	S₁, S₂						Sending data via a socket				

Device	X	Y	M	S	T	C	HC	D	L	SM	SR	E	PR	K	16#	"\$"	DF
S₁	●	●			●	●		●	●			○	●	○	○		
S₂	●	●			●	●		●	●			○	●	○	○		

Pulse Instruction	16-bit Instruction (5 steps)	32-bit Instruction
AH500	AH500	-

Symbol:

SSSEND		SSSENDP	
En		En	
S1		S1	
S2		S2	

S₁ : Socket mode Word

S₂ : Socket number Word

Explanation:

- S₁** is 1 if users want to open the TCP socket, and **S₁** is 0 if users want to open the UDP socket. **S₂** is the socket number.
- The operand **S₁** should be either 0 or 1, and the operand **S₂** should be within the range between 1 and 8.
- Before using this instruction, use SOPEN instruction to open socket connection first and when flag for successful connection (TCP) or opened (UDP) is ON, data transmission can be executed.
- In general, the SSENDP pulse instruction is used.
- When using this instruction, use the following flags for sending data length consisting odd number of bytes .

Socket number	Flags for sending an odd number of characters (TCP socket)	Flags for sending an odd number of characters (UDP socket)
1	SM1375	SM1383
2	SM1376	SM1384
3	SM1377	SM1385
4	SM1378	SM1386
5	SM1379	SM1387
6	SM1380	SM1388
7	SM1381	SM1389
8	SM1382	SM1390

Explanation:

- When send data length is 4 words, please refer to SOPEN instruction for relative setups and examples.

TCP Socket Connection

Remote IP

Remote Port

Local Port

Send Data Length (0 ~ 500 words)

Send Data Address

Receive Data Length (0 ~ 500 words)

Receive Data Address

Keep Alive Timer sec (1 ~ 65535 sec)

- When the flag for sending an odd number of characters is not enabled, the actual send data length is 8 bytes. If the flag for sending an odd number of characters is enabled, the actual send data length is 7 bytes. The actual output for data transmission is shown in the table below.

Data transmission address							
D0		D1		D2		D3	
High Byte	Low Byte	High Byte	Low Byte	High Byte	Low Bytes	High Byte	Low Byte
16#01	16#02	16#03	16#04	16#05	16#06	16#07	16#08
Actual data transmission (The flag for sending an odd number of characters is OFF)							
0102 0304 0506 0708							
Actual data transmission (The flag for sending an odd number of characters is ON)							
0102 0304 0506 07							

Additional remarks:

- If **S₁** or **S₂** exceeds the range, the instruction is not executed, **SM0** is ON, and the error code in **SR0** is 16#2003.
- When the data is sent through the TCP socket, an error occurs if the device from which the data is read is not the device permitted by the socket, the corresponding error flag is ON, the error code is 16#6203; if the send data length is more than 500 words, the corresponding error flag is ON, the error code is 16#6204; if the devices from which the data is read exceeds the device range, the corresponding error flag is ON, error code is 16#6205 and the instruction is not executed.
- When the data is sent through the UDP socket, an error occurs if the device from which the data is read is not the device permitted by the socket, the corresponding error flag is ON, the error code is 16#620C; if the send data length is more than 500 words, the corresponding error flag is ON, the error code is 16#620D; if the devices from which the data is read exceeds the device range, the corresponding error flag is ON, error code is 16#620E and the instruction is not executed.
- When the data is sent through the UDP sockets, an error occurs if the remote communication port number is 0, the corresponding error flag is ON, the error code is 16#620B and the instruction is not executed.

5. When transmitting, an error occurs if the computer as the client abandons the connection, the corresponding error flag is ON, the error code is 16#6214; if there is a response timeout during transmission, the corresponding error flag is ON, the error code is 16#6212 and the instruction is not executed.
6. When executing this instruction, if the network cable is not connected, SM1100 is ON and the error code is 16#600D.

API	Instruction code			Operand							Function						
2202		SRCVD	P	S₁, S₂							Receiving data via enabled socket						
Device	X	Y	M	S	T	C	HC	D	L	SM	SR	E	PR	K	16#	"\$"	DF
S₁	●	●			●	●		●	●			○	●	○	○		
S₂	●	●			●	●		●	●			○	●	○	○		

Pulse Instruction	16-bit Instruction (5 steps)	32-bit Instruction
AH500	AH500	-

Symbol:

SRCVD	SRCVDP	S₁ : Socket mode Word
En	En	
S1	S1	
S2	S2	S₂ : Socket number Word

Explanation:

- S₁** is 1 if users want to open the TCP socket, and **S₁** is 0 if users want to open the UDP socket. **S₂** is the socket number.
- The operand **S₁** should be either 0 or 1, and the operand **S₂** should be within the range between 1 and 8.
- Before using this instruction, use SOPEN instruction to open socket connection first and when flag for successful connection (TCP) or opened (UDP) is ON, data transmission can be executed.
- In general, the SRCVDP pulse instruction is used.

Additional remarks:

- If **S₁** or **S₂** exceeds the range, the instruction is not executed, SM0 is ON, and the error code in SR0 is 16#2003.
- When the data is sent through the TCP socket, an error occurs if the device from which the data is read is not the device permitted by the socket, the corresponding error flag is ON, the error code is 16#6206; if the send data length is more than 500 words, the corresponding error flag is ON, the error code is 16#6207; if the devices from which the data is read exceeds the device range, the corresponding error flag is ON, error code is 16#6208 and the instruction is not executed.
- When the data is sent through the UDP socket, an error occurs if the device from which the data is read is not the device permitted by the socket, the corresponding error flag is ON, the error code is 16#620F; if the send data length is more than 500 words, the corresponding error flag is ON, the error code is 16#6210; if the devices from which the data is read exceeds the device range, the corresponding error flag is ON, error code is 16#6211 and the instruction is not executed.
- When the actual received packet size is bigger than the setting value, an error occurs because only data size that are within the setting range is saved while additional data is ignored, the corresponding error flag is ON, and the error code is 16#6213.
- When transmitting, an error occurs if the computer as the client abandons the connection, the corresponding error flag is ON, the error code is 16#6214; if there is a response timeout during transmission, the corresponding error flag is ON, the error code is 16#6212 and the instruction is not executed.
- When executing this instruction, if the network cable is not connected, SM1100 is ON and the error code is 16#600D.

API	Instruction code			Operand				Function					
2203		SCLOSE	P	$S_1 \cdot S_2$				Closing the socket					

Device	X	Y	M	S	T	C	HC	D	L	SM	SR	E	PR	K	16#	"\$"	DF
S_1	●	●			●	●		●	●			○	●	○	○		
S_2	●	●			●	●		●	●			○	●	○	○		

Pulse Instruction	16-bit Instruction (5 Steps)	32-bit Instruction
AH500	AH500	-

Symbol:

SCLOSE	SCLOSEP
En	En
S1	S1
S2	S2

S_1 : Socket mode Word

S_2 : Socket number Word

Explanation:

1. S_1 is 1 if users want to open the TCP socket, and S_1 is 0 if users want to open the UDP socket. S_2 is the socket number.
2. The operand S_1 should be either 0 or 1, and the operand S_2 should be within the range between 1 and 8.
3. Before closing the socket, it need to stay connected or the instruction is not be executed.
4. When the TCP socket is closed by the server, the client continues to be connected to the local communication port (the connection flag is ON); when the TCP socket is closed by the client, the client is not connected to the local communication port. After the instruction is executed to close the TCP socket, the corresponding flag is OFF.
5. After the instruction is executed to close the UDP socket, the corresponding flag is OFF.
6. In general, the SCLOSEP pulse instruction is used.

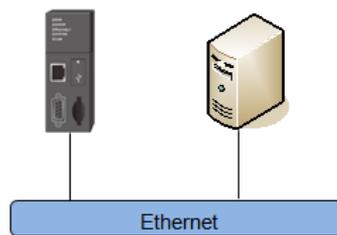
Additional remarks:

1. If S_1 or S_2 exceeds the range, the instruction is not executed, SM0 is ON, and the error code in SR0 is 16#2003.
2. When closing connection, an error occurs if the computer as the client abandons the connection, the corresponding error flag is ON, the error code is 16#6214; if there is a response timeout, the corresponding error flag is ON, the error code is 16#6212 and the instruction is not executed.
3. When executing this instruction, if the network cable is not connected, SM1100 is ON and the error code is 16#600D.

3. Examples of AH Series

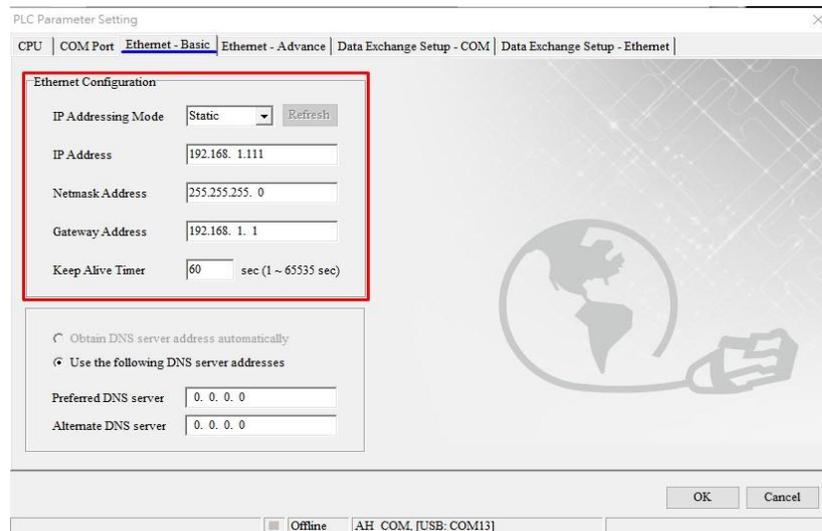
【System Structure】

<p>Role: Client (Master) Server (Slave)</p>	<p>AH IP : 194.168.1.111 Local Port : 3200 Send Length : 200 Send Address : D1000 Receive Length : 100 Receive Address : L0</p>	<p>PC IP : 194.168.1.100 Local Port : 3201</p>
---	---	--

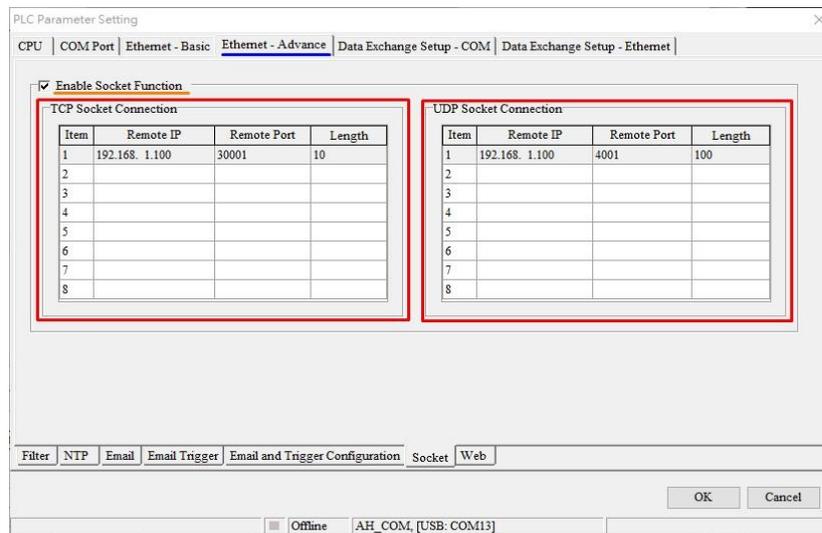


【Software Settings】

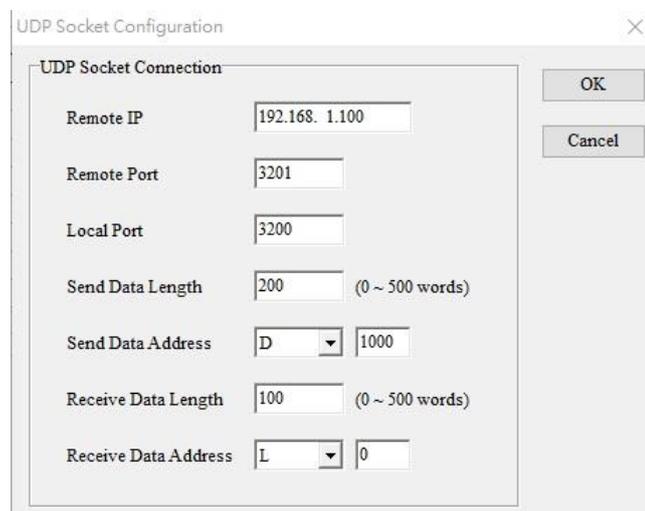
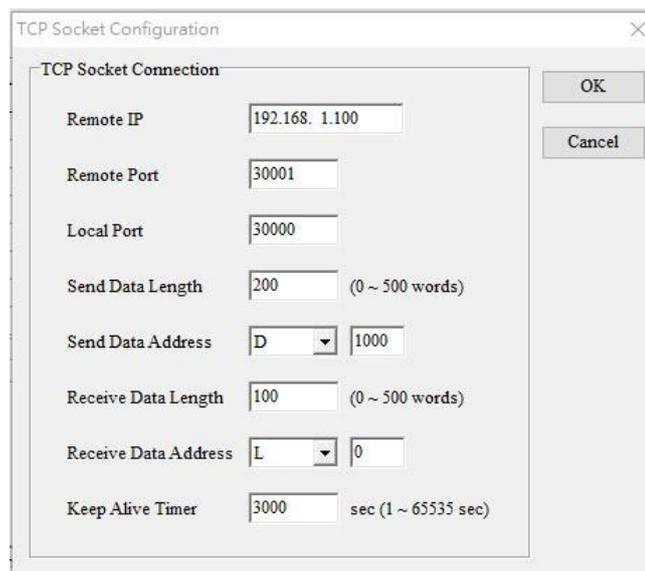
- PLC Setup
 - Ethernet Basic Setting: IP
ISPSOft → HWCONFIG → Ethernet-Basic



- Ethernet Advance Setting: Socket
ISPSOft → HWCONFIG → Ethernet-Advanced → Enable Socket Function → TCP Socket Configuration



•TCP/UDP Socket Configuration



【Control Requirement】

1. Use SM instructions to control sockets. There are a total of 8 socket groups and the following is an example of the first group.

TCP Socket Number

TCP Socket Number	Successful connection flag	Data received flag	Data sent flag	Starting connection flag	Closing connection flag	Sending data flag	Receiving data flag	Error flag
1	SM1270	SM1271	SM1272	SM1273	SM1274	SM1275	SM1276	SM1277

UDP Socket Number

UDP Socket Number	Starting connection flag	Data received flag	Sending Data Flag	Receiving data flag	Error flag
1	SM1334	SM1335	SM1336	SM1337	SM1338

2. The socket number from Software Setting and PLC programs control the corresponding flags to execute connection and data transmission. The following example corresponds to socket number 1.

3.1 AH Series Example 1: TCP Sample Program (S3: 1 as Client/PC as Server)

【Steps】

1. Set M0 to ON to open socket connection. (See Network 1 below)
2. When connection is successful, M0 is OFF. (See Network 2 below)
3. If M1 is ON, a PLC sends data from D1000~D1199 (the send data length is 200 in the Socket Setting); write the content of send data in D1000~D1199. The PC receives the send data. (See Network 3 below). Then, clear M1 or M1 is OFF. (See Network 4 below)

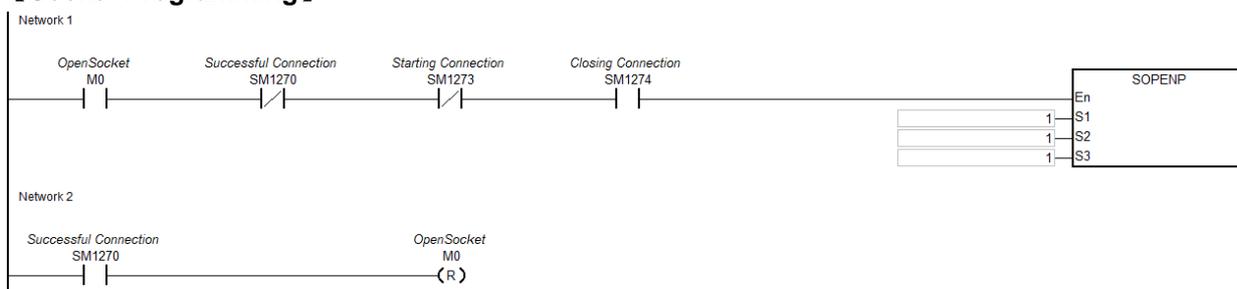
Example: PLC send data content 4141 4242 4343 4444 4545
 PC receives AA BB CC DD EE

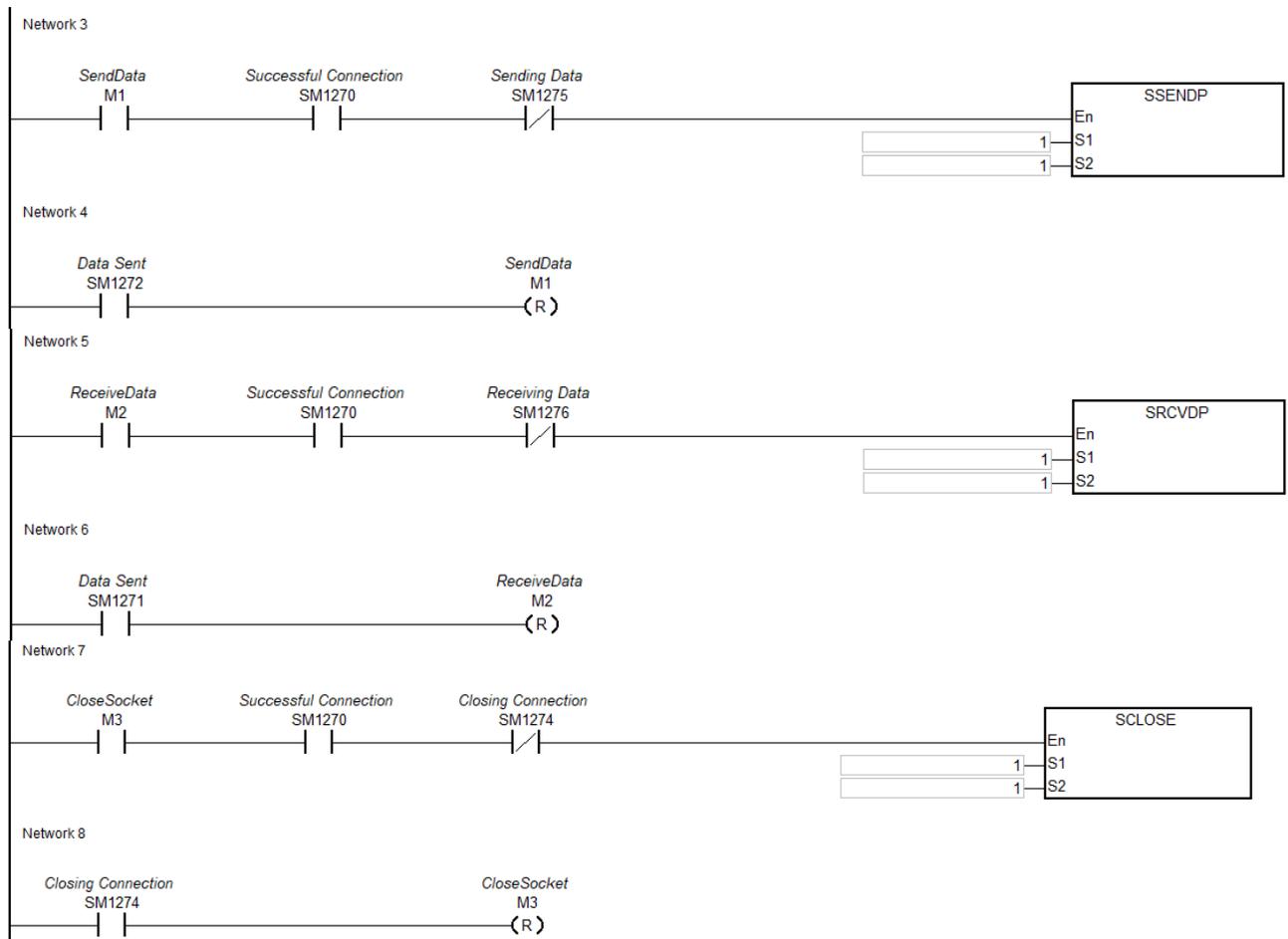
4. If M2 is ON, the data is sent from the PC to a PLC, the PLC receives and places data in L0~L99 (receive data length is 100 in Socket Settings). (See Network 5 below) Then, clear M2 or M2 is OFF. (See Network 6 below)

Example: PC send data content AA BB CC DD
 PLC receives 4141 4242 4343 4444 (place in L0 L1 L2 L3 accordingly)

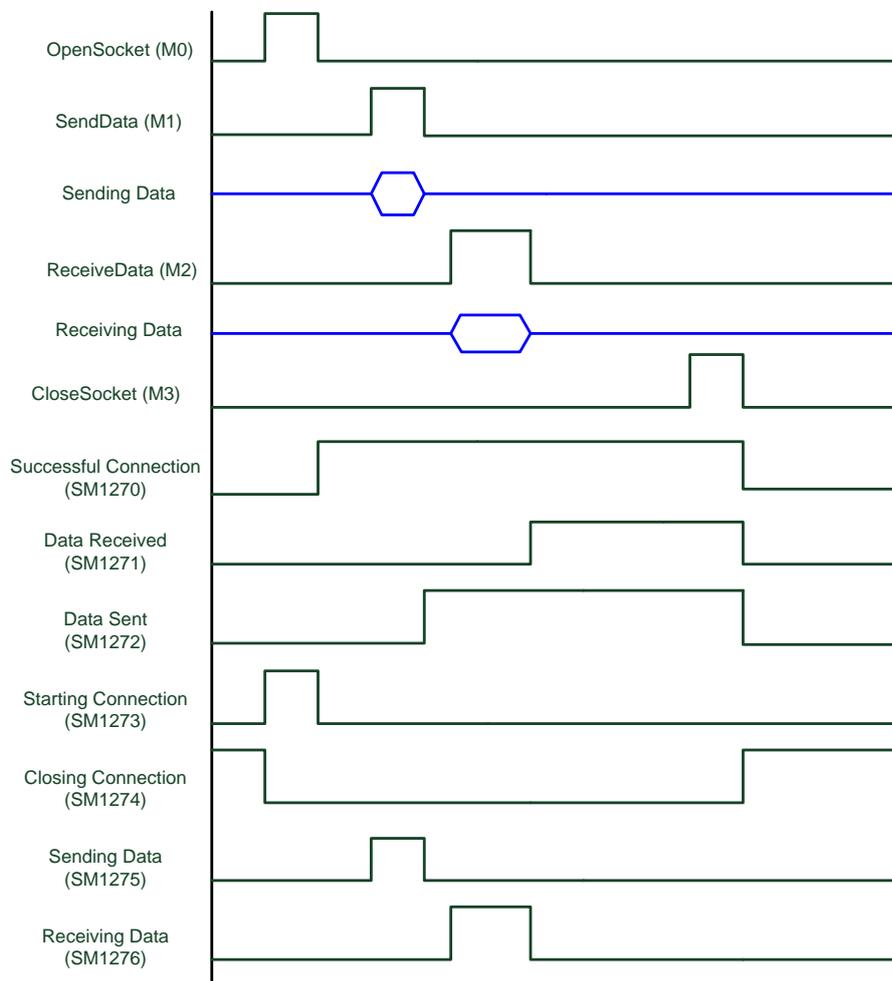
5. Set M3 to ON to close socket connection. (See Network 7 below)

【Socket Programming】





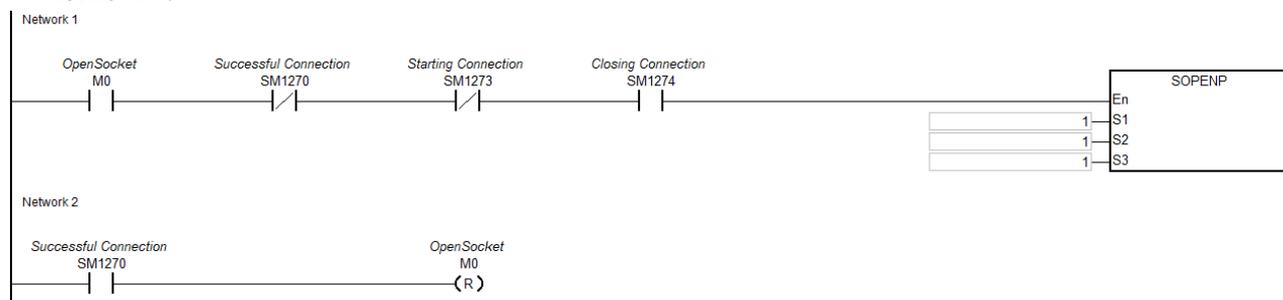
【 Timing Diagram 】



【 Additional Remarks 】

- PLC : TCP client
PC : TCP server, wait for client connection

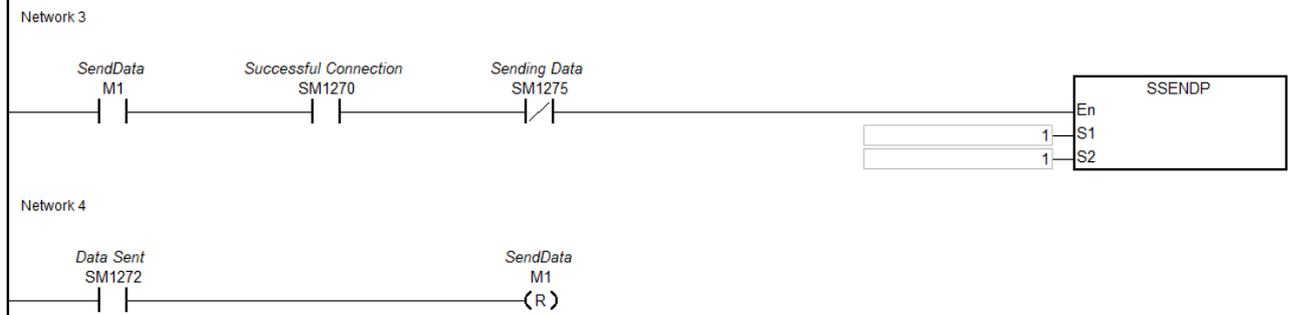
• Network1 :



- Before opening the socket (M0) to execute connection, check that successful connection SM1270 is OFF, starting connection SM1273 is OFF and closing connection SM1274 is ON.
- When starting PC's socket connection, wait for the PLC to connect.

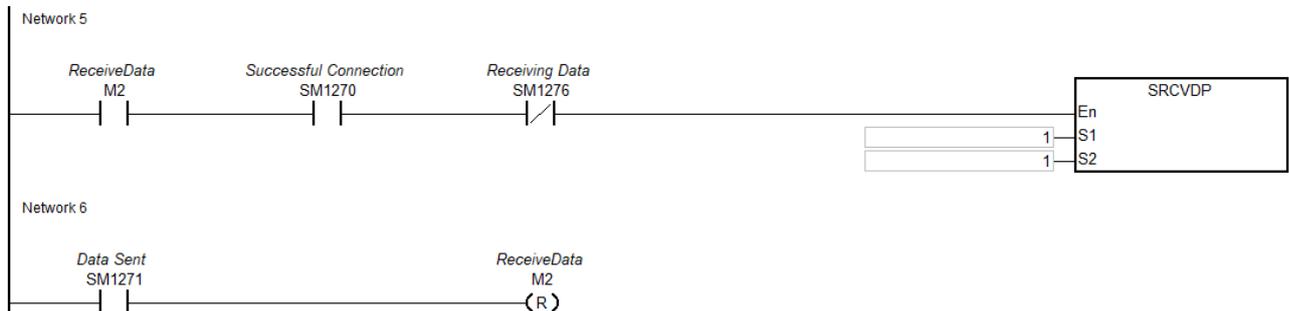
- If M0 is ON, the SOPEN instruction executes the starting connection flag SM1273 to ON. Once the connection is successful, SM1270 is ON then clear SM1273 or SM1273 is OFF, which means successful socket connection and clear M0 or M0 is OFF.

• Network3 :



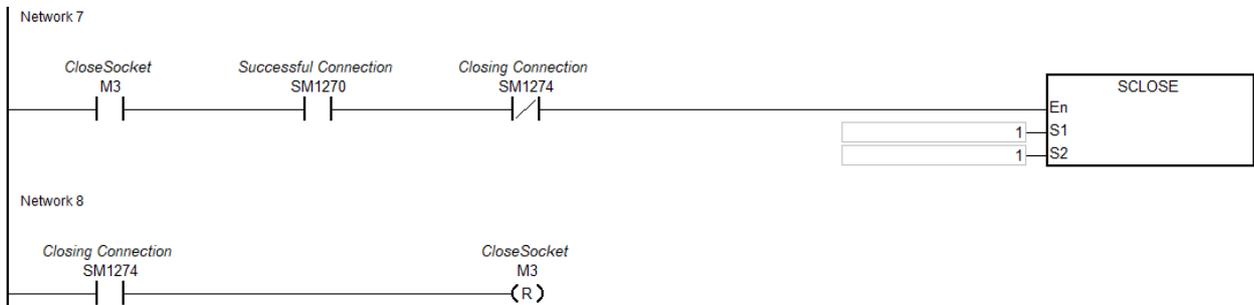
- Before sending data, please check the data is written in the sending device of HWCONFIG setting.
- When send data M1 is ON, the sending data flag SM1275 is ON.
- When data is successfully sent, SM1272 is ON then clear the sending data flag SM1275 or SM1275 is OFF. To send a new data, we suggest to clear M1 or M1 is OFF.

• Network5 :



- When receive data M2 is ON, the receiving data SM1276 is ON.
- When data is sent from the PC and a PLC receives it, the data sent flag SM1271 is ON so that PLC programs can determine the flag and handle the receive data from the assigned device position in HWCONFIG.

• Network7 :



- When sending or receiving data is no longer required, set close socket (M3) to ON.
- When closing connection, SM1274 is ON then set other flags to OFF. Note: when error flag SM1277 is ON, users need to clear the flag.

- When SM1274 changes from OFF to ON, clear close socket M3 (or M3 is OFF) so that socket connection will not be closed again once M3 is ON.

3.2 AH Series Example 2: TCP Sample Program (S3: 0 as Server/PC as Client)

【Steps】

1. Set M0 to ON to open socket connection. (See Network 1 below)
2. When connection is successful, M0 is OFF. (See Network 2 below)
3. Set M1 to ON, a PLC sends data from D1000~D1199 (the send data length is 200 in Socket Setting); write the content of send data in D1000~D1199. The PC receives the send data. (See Network 3 below).

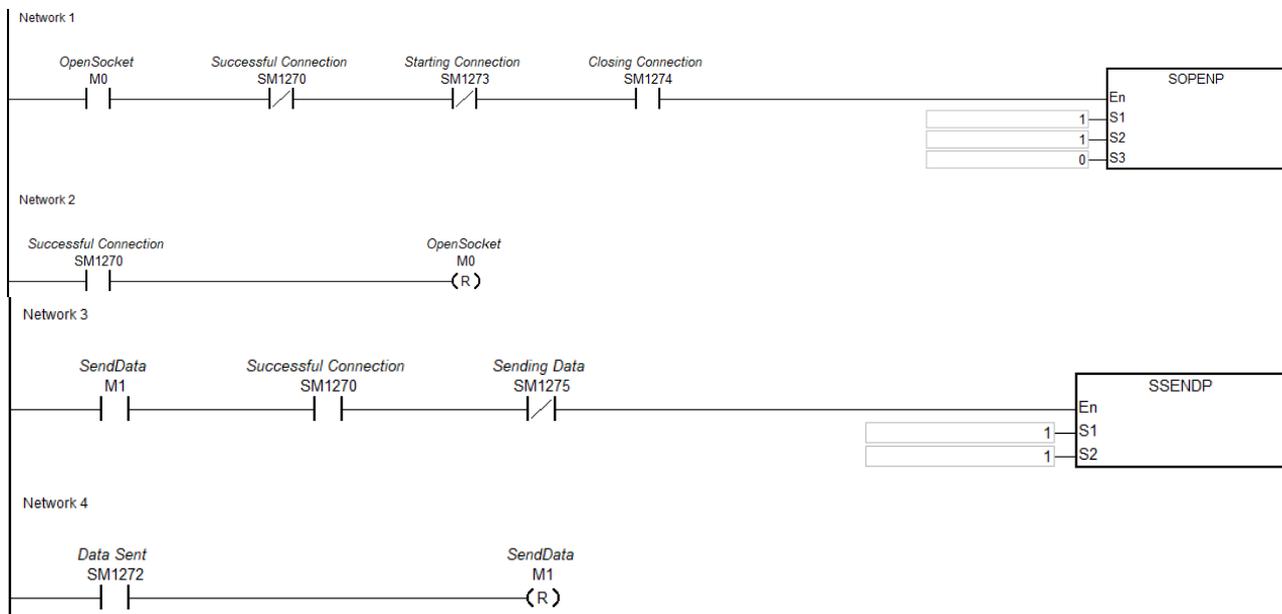
Example: PLC send data content 4141 4242 4343 4444 4545
 PC receives AA BB CC DD EE

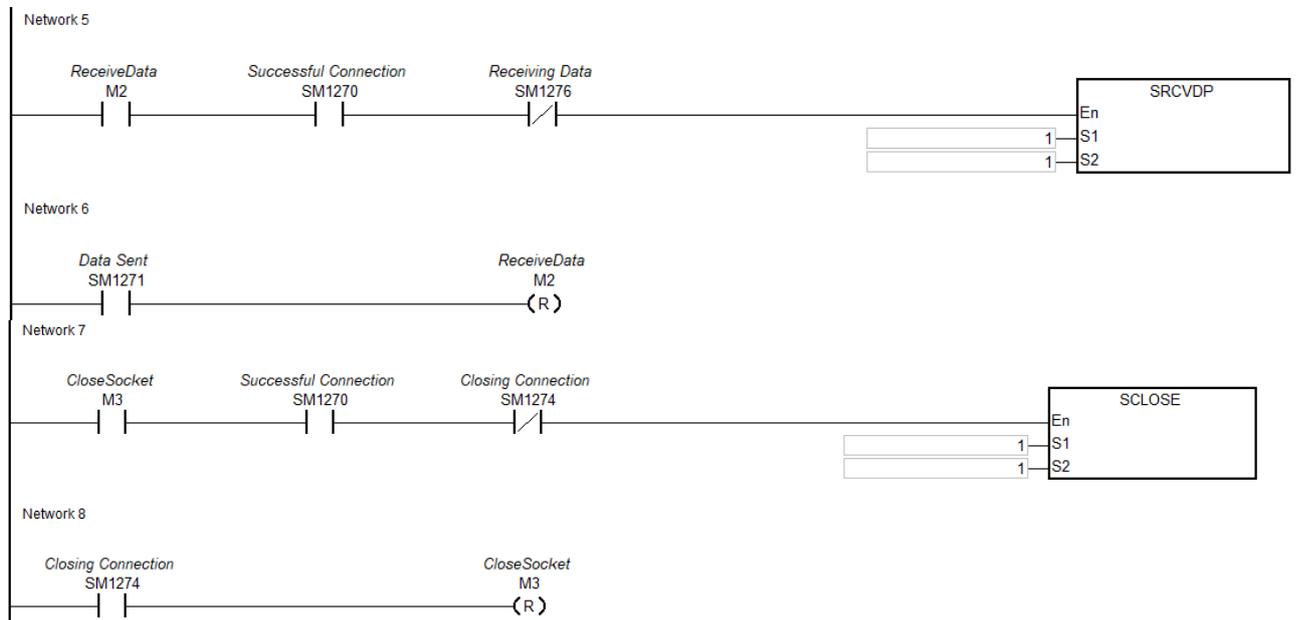
4. Set M2 to ON, the data is sent from the PC to a PLC, the PLC receives and places data in L0~L99 (receive data length is 100 in Socket Setting). (See Network 5 below)

Example: PLC send data content AA BB CC DD
 PC receives 4141 4242 4343 4444 (place in L0 L1 L2 L3 accordingly)

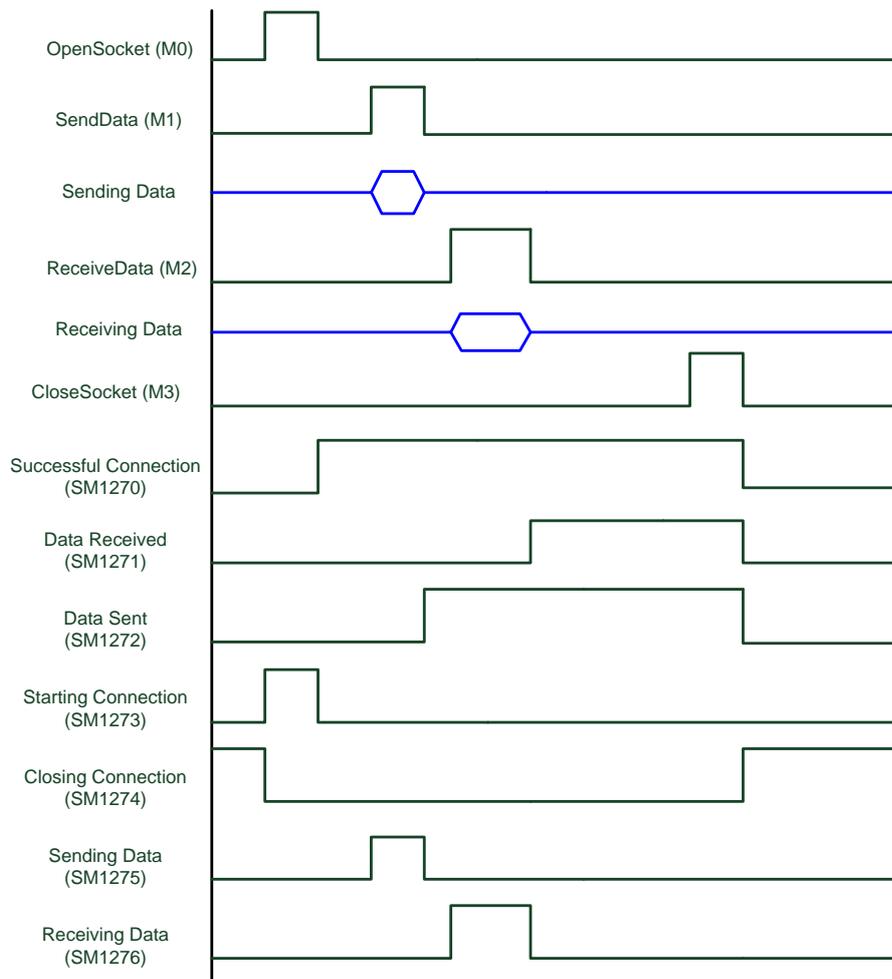
5. Set M3 to ON to close socket connection. (See Network 7 below)

【Socket Programming】





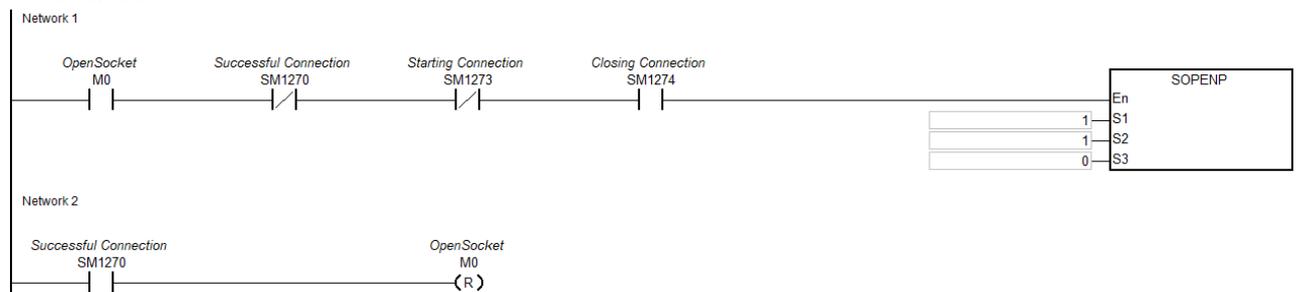
【Timing Diagram】



【 Additional Remarks 】

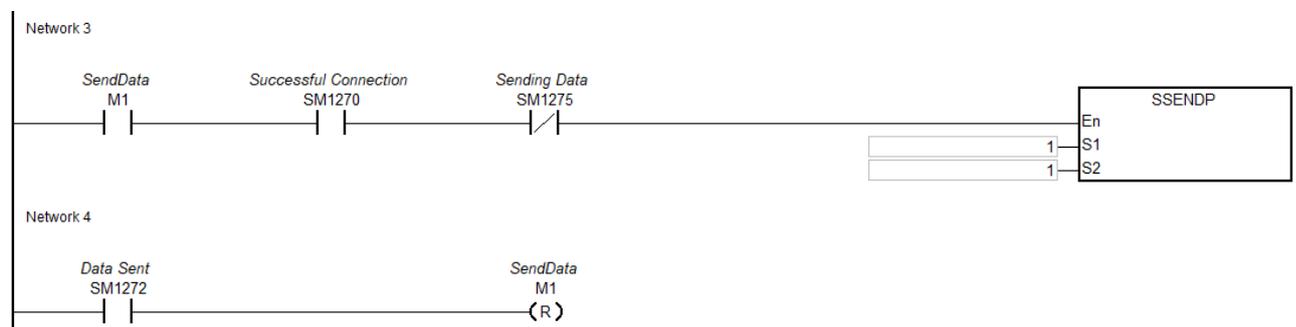
- PLC : TCP server, wait for client connection.
PC : TCP client

• Network1 :



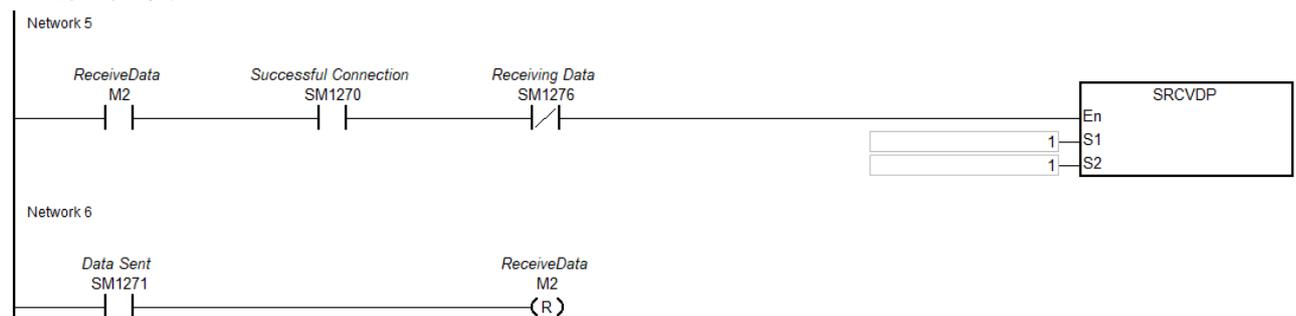
- Before opening the socket (M0) to execute connection, check that successful connection SM1270 is OFF, starting connection SM1273 is OFF and closing connection SM1274 is ON.
- When open socket M0 is ON, the starting connection flag SM1273 is ON then wait for PC's connection.
- When connection from the PC is successful, SM1270 is ON, the starting connection SM1273 is cleared or OFF and open socket M0 is also cleared or OFF.

• Network3 :



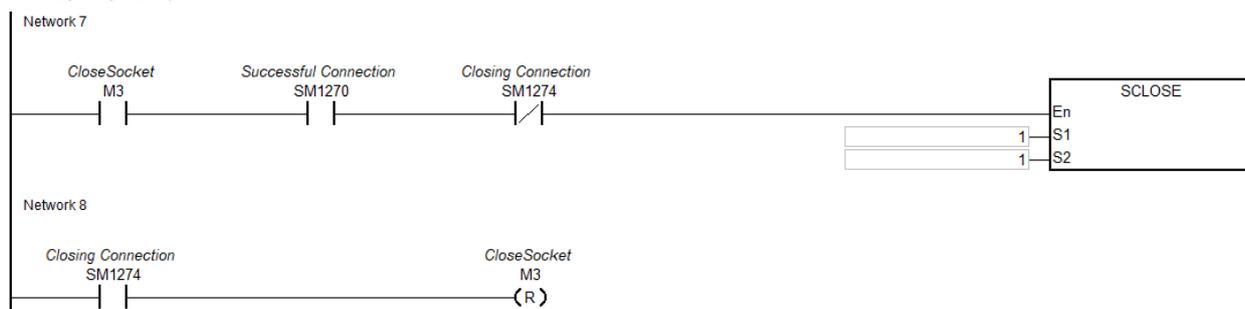
- Before sending the data, please check the data is written in the sending device of HWCONFIG setting.
- When send data M1 is ON, the sending data flag SM1275 is ON.
- When data is successfully sent, SM1272 is ON then clear the sending data flag SM1275 or SM1275 is OFF. To send a new data, we suggest to clear M1 or M1 is OFF.

• Network5 :



- When receive data M2 is ON, the receiving data SM1276 is ON.
- When data is send from a PC and the PLC receives it, set data sent flag SM1271 to ON so that PLC programs can determine the flag and handle the receive data from the assigned device position in HWCONFIG.

• Network7 :



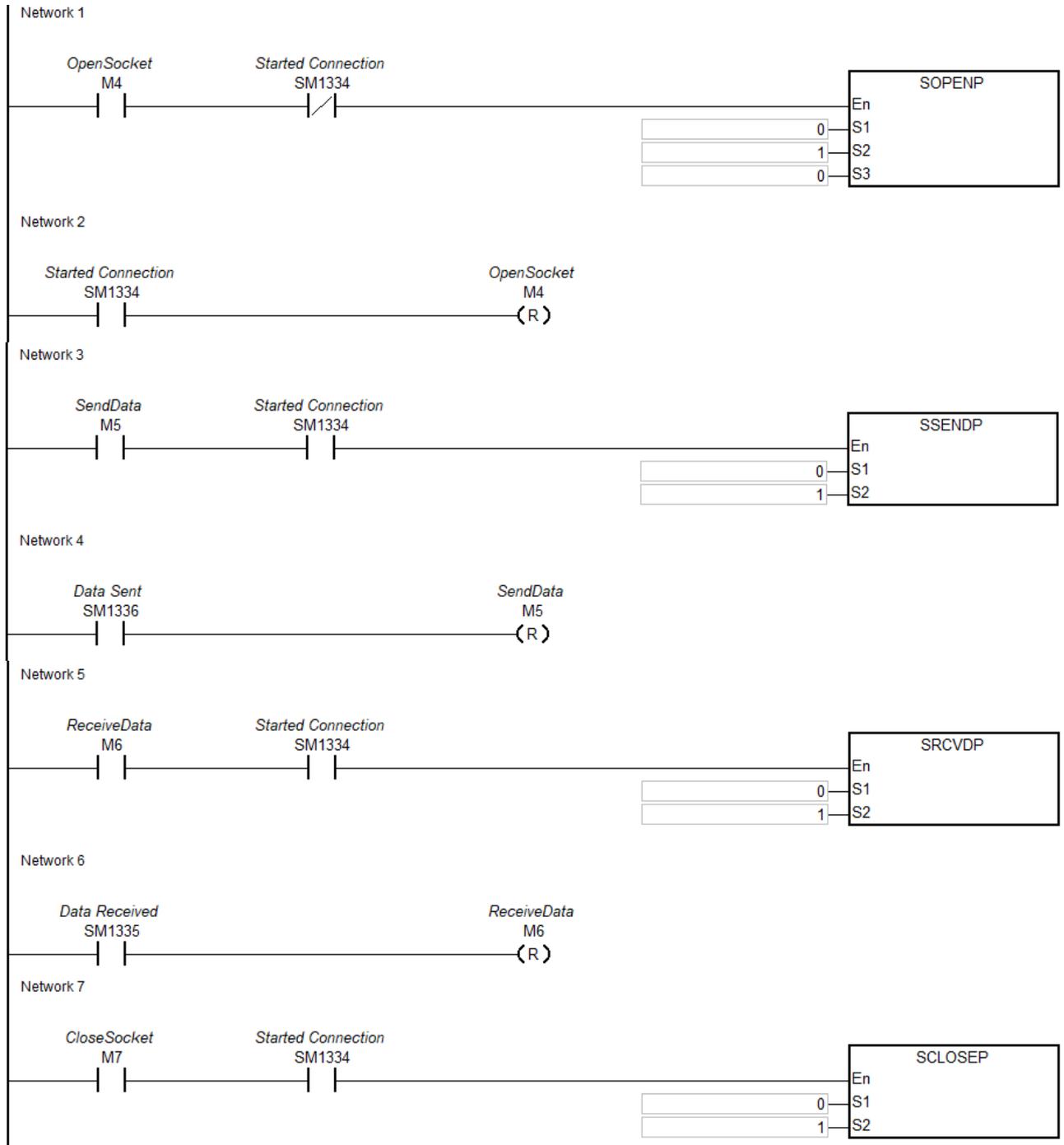
- When sending and receiving data is no longer required, set close socket (M3) to ON.
- When closing connection, SM1274 is ON then set other flags to OFF. Note: when error flag SM1277 is ON, users need to clear the flag.
- When SM1274 changes from OFF to ON, clear close socket M3 (or M3 is OFF) so that socket connection will not be closed again once M3 is ON.

3.3 AH Series Example 3: UDP Sample Program

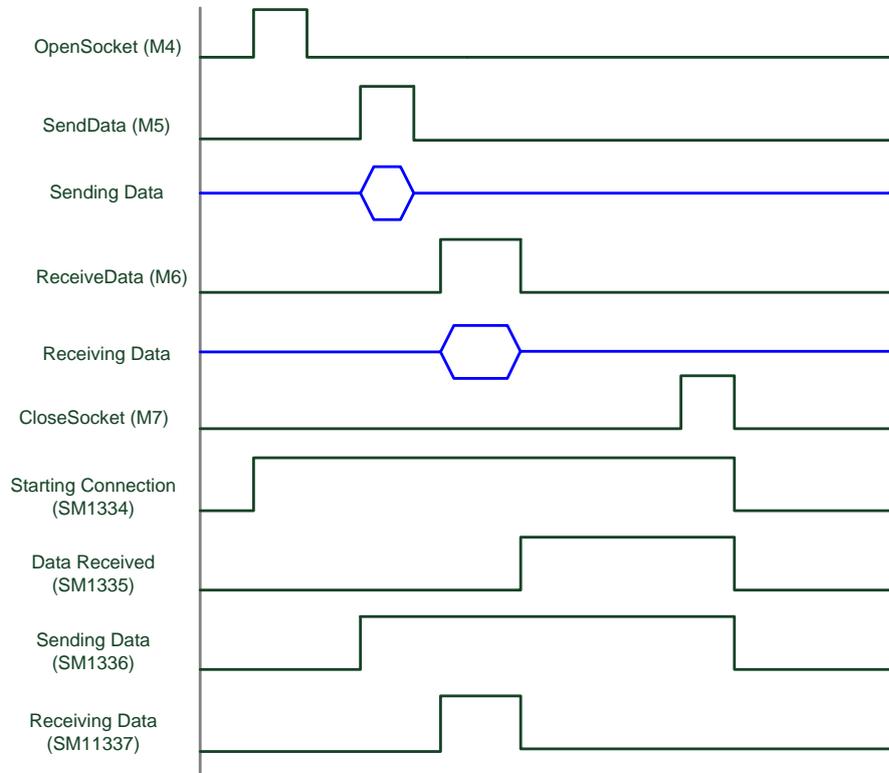
【Steps】

1. Set M4 to ON to open socket connection. (See Network 1 below)
2. Set M5 to ON, a PLC sends data from D1000~D1199 (the send data length is 200 in Socket Setting); write the content of send data in D1000~D1199. The PC receives the send data. (See Network 3 below).
 Example: PLC send data content 4141 4242 4343 4444 4545
 PC receives AA BB CC DD EE
3. Set M6 to ON, the data is sent from the PC to a PLC, the PLC receives and places data in L0~L99 (receive data length is 100 in Socket Setting). (See Network 5 below)
 Example: PC send data content AA BB CC DD
 PLC receives 4141 4242 4343 4444 (place in L0 L1 L2 L3 accordingly)
4. Set M7 to ON to close socket connection. (See Network 7 below)

【 Socket Programming 】

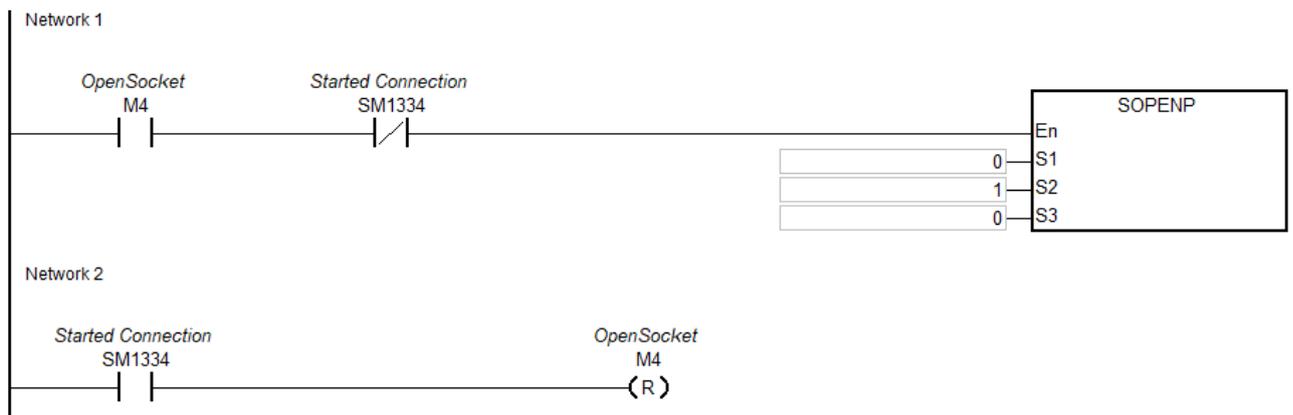


【 Timing Diagram 】



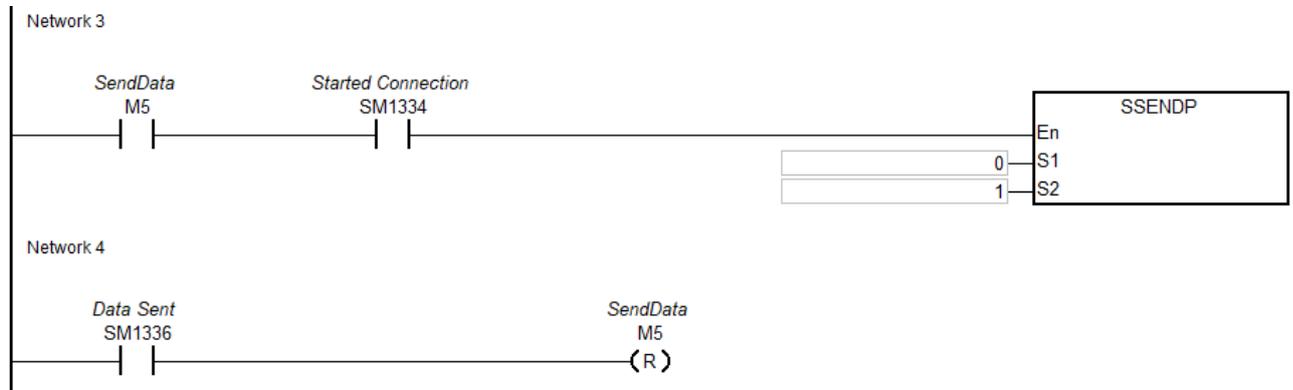
【 Additional Remarks 】

- **PLC in UDP mode:**
UDP mode does not have Server/Client problem. Both sides need to open UDP socket for data transmission.
- **Network1 :**



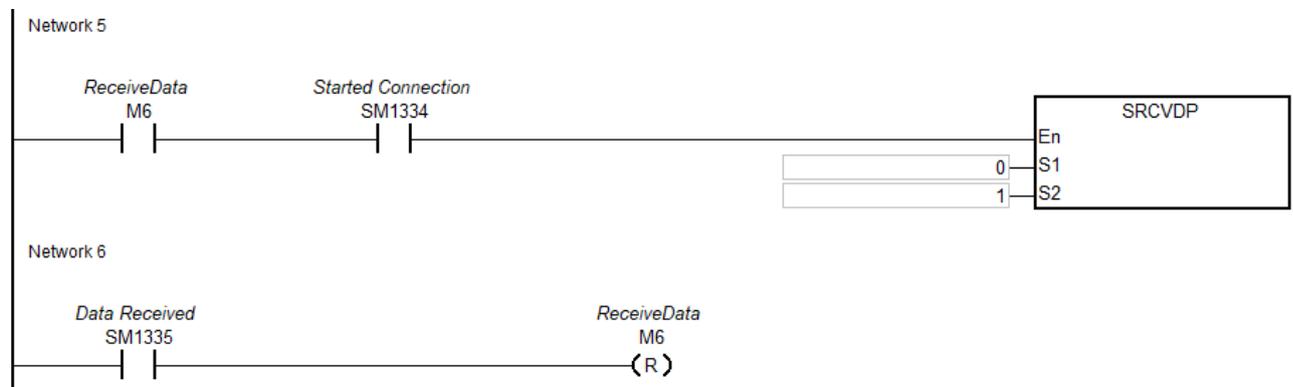
- Before opening a socket (M4), check the started connection flag SM1334 is OFF.
- When a UDP port is opened on the PC and a socket is opened (M4 is ON) on the PLC, then starting connection SM1344 is ON, meaning both side connection is successful.

• Network3 :



- Before sending data, please check the data is written in the sending device in HWCONFIG setting.
- When M5 is ON, the data is sending.
- When data is successfully sent, SM1336 is ON. To send a new data, we suggest to clear M5 or M5 is OFF.
- If a PC receives data from a PLC, please use the PC to send the data and once the PLC receives the data, set data received SM1335 to ON so that PLC programs can determine the flag and handle the data from the assigned device position in HWCONFIG.

• Network5 :



- When receive data M6 is ON, the receiving data flag SM1337 is ON.
- When data is send from a PC and the PLC receives it, set data received flag SM1335 to ON so that PLC programs can determine the flag and handle the receive data from the assigned device position in HWCONFIG. To send a new data, we suggest to clear M6 or M6 is OFF.

• Network7 :



- When sending or receiving data is no longer required, set M7 to ON to close socket connection.

- When the connection is closed, the started connection flag SM1334 is OFF, then set other flags to OFF. Note: When error flag SM1338 is ON, users need to clear the flag.
- When SM1334 changes to OFF, clear close socket M7 (or M7 is OFF) so that socket connection will not be closed again once M7 is ON.

4. AS Series- List of Ethernet Instructions (Socket)

API	Instruction Code (bit)		Pulse Instruction	Function
	16	32		
<u>2200</u>	SOPEN	–	✓	Opening a socket
<u>2201</u>	SSEND	–	✓	Sending data via a socket
<u>2203</u>	SCLOSE	–	✓	Closing a socket

4.1 AS Series- Explanation of Ethernet Instructions (Socket)

API	Instruction Code			Operand							Function						
2200		SOPEN	P	S₁, S₂, S₃							Opening a socket						

Device	X	Y	M	S	T	C	HC	D	FR	SM	SR	E	K	16#	“\$”	F
S₁	●	●			●	●		●	●			○	○	○		
S₂	●	●			●	●		●	●			○	○	○		
S₃	●	●			●	●		●	●			○	○	○		

Data Type	BOOL	WORD	DWORD	LWORD	UINT	INT	DINT	LINT	REAL	LREAL	TMR	CNT	STRING
S₁		●			●	●							
S₂		●			●	●							
S₃		●			●	●							

Pulse Instruction	16-bit Instruction	32-bit Instruction
AS	AS	-

Symbol:

SOPEN		SOPENP	
En		En	
S1		S1	
S2		S2	
S3		S3	

- S₁** : Socket mode
- S₂** : Socket number
- S₃** : Communication mode

Explanation:

1. This instruction sends data through the socket specified by **S₁**. Set **S₁** to 1 to open a TCP socket, and set **S₁** to 0 to open a UDP socket.
2. **S₂** is the socket number and should correspond to a maximum setting of 4 Ethernet sockets.
3. When opening the TCP socket (**S₁** is 1) and **S₃** is 1, the AS Series PLC functions as a client and sends a TCP connection request to the server; if **S₃** is 0, the AS Series PLC functions as a server and waits for a TCP connection request from the client. To start a UDP connection (**S₁** is 0), set **S₃** to 0 or 1.
4. The operand **S₁** should be either 0 or 1 (default is 0), operand **S₂** should be between 1 to 4 (default is 1), operand **S₃** should be either 0 or 1 (default is 0); when values exceeds the range, error code H'2003 shows on the PLC.
5. Before using the instruction, set the following setting in HWCONFIG in ISPSOft.
 - PLC Parameter Setting→ Basic →Setting the IP address and the netmask address
 - PLC Parameter Setting→ Advanced→Socket→Enable Socket Function
 - PLC Parameter Setting→ Advanced→Socket→ TCP/UDP Socket Connection and Setting sockets to be used.

6. When TCP and UDP socket parameters modifying in the program, please refer to **SCONF instructions (API2209)**. (Example 4)
7. When TCP socket is opened, use the following settings for the Socket IP and communication ports.

S ₁ Start Mode	Remote IP	Local Communication Port	Remote Communication Port	Description
1	Specific IP address	0	0	Illegal
1	Specific IP address	0	Not equal to 0	Client mode: Specifies IP address, but not local communication port
1	Specific IP address	Not equal to 0	0	Illegal
1	Specific IP address	Not equal to 0	Not equal to 0	Client mode: Specifies IP address, local communication port, and remote communication port
1	0.0.0.0	No limit to the value	No limit to the value	Illegal
0	Specific IP address	0	No limit to the value	Illegal
0	Specific IP address	Not equal to 0	0	Server mode: Specifies IP address, but not remote communication port
0	Specific IP address	Not equal to 0	Not equal to 0	Server mode: Specifies IP address and remote communication port
0	0.0.0.0	0	No limit to the value	Illegal
0	0.0.0.0	Not equal to 0	0	Server mode: Does not specify IP address or remote communication port
0	0.0.0.0	Not equal to 0	Not equal to 0	Server mode: Does not specify IP address, but does specify remote communication port

8. If data is sent through a TCP socket, and no error occurs after the instruction is executed, the socket starts to connect with the remote device and the flag for starting connection is ON. If the connection is made successfully, the flag for successful connection is ON, and the flag for starting connection is OFF. If an error occurs, the error flag is ON.

TCP socket number	Successful connection flag	Data received flag	Data sent flag	Starting connection flag	Closing connection flag	Sending data flag	Error Flag
1	SM1270	SM1271	SM1272	SM1273	SM1274	SM1275	SM1277
2	SM1278	SM1279	SM1280	SM1281	SM1282	SM1283	SM1285
3	SM1286	SM1287	SM1288	SM1289	SM1290	SM1291	SM1293
4	SM1294	SM1295	SM1296	SM1297	SM1298	SM1299	SM1301

9. If data is transmitted through a UDP socket and no error occurs after the instruction is executed, the flag for starting connection is ON. If an error occurs, the error flag is ON.

UDP socket number	Starting connection flag	Data received flag	Sending data flag	Closing connection flag	Error Flag
1	SM1334	SM1335	SM1336	SM1337	SM1338
2	SM1339	SM1340	SM1341	SM1342	SM1343
3	SM1344	SM1345	SM1346	SM1347	SM1348

UDP socket number	Starting connection flag	Data received flag	Sending data flag	Closing connection flag	Error Flag
4	SM1349	SM1350	SM1351	SM1352	SM1353

10. If data is transmitted through a TCP Socket in Server mode or through a UDP Socket, it is not allowed to use the following communication port for AS series PLC.

Socket Type	Communication Port Number	Communication Protocol
TCP	80	HTTP
TCP	502	MODBUS TCP
TCP	44818	EtherNet/IP
UDP	68	DHCP/BOOTP
UDP	2222	EtherNet/IP
UDP	44818	EtherNet/IP
UDP	20006	Self-defined protocol for AS Series

11. In general, the SOPENP pulse instruction is used.

Additional Remarks:

1. The following table lists TCP connection errors:

Error Code (SR180)	Error Flag	Description
16#2003	SM0	S ₁ , S ₂ or S ₃ exceeds the range
16#600C	SM1109	Local communication port used
16#600D	SM1100	Ethernet network not connected
16#6200	TCP Socket Error Flag	Illegal IP address
16#6201	TCP Socket Error Flag	Illegal TCP socket communication mode setting
16#6202	TCP Socket Error Flag	Illegal TCP socket mode setting
16#6203	TCP Socket Error Flag	Illegal address for sending data
16#6204	TCP Socket Error Flag	Sent data length exceeds the range
16#6205	TCP Socket Error Flag	Source data device exceeds the range
16#6206	TCP Socket Error Flag	Illegal address for receiving data
16#6207	TCP Socket Error Flag	Received data length exceeds the range
16#6208	TCP Socket Error Flag	Target data device exceeds the range
16#6212	TCP Socket Error Flag	TCP socket communication timeout
16#6213	TCP Socket Error Flag	Size of data received larger than dataset
16#6214	TCP Socket Error Flag	TCP socket connection rejected by remote equipment
16#6215	TCP Socket Error Flag	TCP socket not connected
16#6217	TCP Socket Error Flag	TCP socket connection triggered
16#6218	TCP Socket Error Flag	Sending data via TCP socket triggered
16#621A	TCP Socket Error Flag	Disabling TCP Socket connection triggered

2. The following table explains UDP connection errors:

Error Code (SR180)	Error Flag	Description
16#2003	SM0	S ₁ , S ₂ , or S ₃ exceeds the range
16#600C	SM1109	Local communication port used
16#600D	SM1100	Ethernet network not connected
16#6209	UDP Socket Error Flag	Illegal IP address
16#620A	UDP Socket Error Flag	Illegal communication mode
16#620C	UDP Socket Error Flag	Illegal address for sending data
16#620D	UDP Socket Error Flag	Length of sent data exceeds the range

Error Code (SR180)	Error Flag	Description
16#620E	UDP Socket Error Flag	Source data device exceeds the range
16#620F	UDP Socket Error Flag	Illegal address for receiving data
16#6210	UDP Socket Error Flag	Length of data received exceeds the range
16#6211	UDP Socket Error Flag	Target data device exceeds the range
16#6213	UDP Socket Error Flag	Size of data received larger than dataset
16#6215	UDP Socket Error Flag	UDP Socket not connected
16#6217	UDP Socket Error Flag	UDP Socket connection triggered
16#6218	UDP Socket Error Flag	Sending of data through UDP Socket triggered
16#621A	UDP Socket Error Flag	Disabling UDP Socket connection triggered

- When the client and server are AS Series PLCs and both have communication timeout settings, the server automatically cuts the connection if a timeout occurs on the server first. In this case, the error flag on the client is not ON. On the other hand, if a timeout occurs on the client first, the error flag on the client is ON and automatically cut off the connection.

API	Instruction Code			Operand							Function						
2201		SSEND	P	S₁, S₂							Sending data via a socket						
Device	X	Y	M	S	T	C	HC	D	FR	SM	SR	E	K	16#	"\$"	F	
S₁	●	●			●	●		●	●			○	○	○			
S₂	●	●			●	●		●	●			○	○	○			
Data Type	BOOL	WORD	DWORD	LWORD	UINT	INT	DINT	LINT	REAL	LREAL	TMR	CNT	STRING				
S₁		●			●	●											
S₂		●			●	●											
								Pulse Instruction			16-bit Instruction			32-bit Instruction			
								AS			AS			-			

Symbol:

SSSEND		SSSENDP	
En		En	
S1		S1	
S2		S2	

S₁ : Socket mode

S₂ : Socket number

Explanation:

1. This instruction sends data through the socket specified by S1. Set S1 to 1 to open a TCP socket, and set S1 to 0 to open a UDP socket.
2. **S₂** is the socket number and should correspond to a maximum setting of 4 Ethernet sockets.
3. The operand **S₁** should be either 0 or 1 (default is 0), and the operand **S₂** should be within the range between 1 and 4 (default is 1); If the device exceeds the range, error code H'2003 is displayed on the PLC.
4. Before using this instruction, use the SOPEN instructions to open the socket. If the flag for successful connection of the TCP socket is ON, or the flag to starting connection of the UDP socket is ON, you can use this instruction for data transmission.
5. In general, the SSSENDP pulse instruction is used.

Additional Remark:

1. The following table lists TCP connection errors:

Error Code	Error Flag	Description
16#2003	SM0	S₁ or S₂ exceeds the range
16#600D	SM1100	Ethernet network not connected
16#6202	TCP Socket Error Flag	Illegal TCP Socket mode setting
16#6203	TCP Socket Error Flag	Illegal address for sending data
16#6204	TCP Socket Error Flag	Length of sent data exceeds the range
16#6205	TCP Socket Error Flag	Source data device exceeds the range

Error Code	Error Flag	Description
16#6212	TCP Socket Error Flag	TCP Socket connection timeout
16#6214	TCP Socket Error Flag	TCP Socket connection rejected by remote equipment
16#6215	TCP SocketError Flag	TCP Socket not connected
16#6218	TCP SocketError Flag	Sending data triggered

2. The following table explains UDP connection errors:

Error Code	Error Flag	Description
16#2003	SM0	S₁ or S₂ exceeds the range
16#600D	SM1100	Ethernet network not connected
16#620A	UDP Socket Error Flag	Illegal UDP socket communication mode setting
16#620C	UDP Socket Error Flag	Illegal address for sending data
16#620D	UDP Socket Error Flag	Length of sent data exceeds the range
16#620E	UDP Socket Error Flag	Source data device exceeds the range
16#6218	UDP Socket Error Flag	Sending data triggered

API	Instruction Code			Operand							Function						
2203		SCLOSE	P	S₁, S₂							Closing a socket						

Device	X	Y	M	S	T	C	HC	D	FR	SM	SR	E	K	16#	"\$"	F
S₁	●	●			●	●		●	●			○	○	○		
S₂	●	●			●	●		●	●			○	○	○		

Data Type	BOOL	WORD	DWORD	LWORD	UINT	INT	DINT	LINT	REAL	LREAL	TMR	CNT	STRING
S₁		●			●	●							
S₂		●			●	●							

Pulse Instruction	16-bit Instruction	32-bit Instruction
AS	AS	-

Symbol:

SCLOSE	SCLOSEP
En	En
S1	S1
S2	S2

S₁ : Socket mode

S₂ : Socket number

Explanation:

1. This instruction closes the TCP or UDP socket specified by S1. Set S1 to 1 to close a TCP socket, and set S1 to 0 to close a UDP socket.
2. **S₂** is the socket number and should correspond to a maximum setting of 4 Ethernet sockets.
3. The operand **S₁** should be either 0 or 1 (default is 0), and operand **S₂** should be within the range between 1 and 4 (default is 1); If exceeds the range, the error code H'2003 is displayed on the PLC.
4. Before closing the socket, make sure that the socket is connected or else the instruction is not executed.
5. If the client closes a TCP socket, the server continues to be connected to the local communication port (the flag for successful connection is ON). If the server closes a TCP socket, the server is no longer connected to the local communication port after the execution of the instruction is complete. After a TCP socket is closed, the corresponding flags are OFF.
6. After the instruction is executed to close a UDP socket, the corresponding flag is OFF.
7. In general, the SCLOSEP pulse instruction is used.

Additional Remark:

1. The following table lists TCP connection errors:

Error Code	Error Flag	Description
16#2003	SM0	S₁ or S₂ exceeds the range
16#600D	SM1100	Ethernet network not connected
16#6212	TCP Socket Error Flag	TCP socket communication timeout
16#6214	TCP Socket Error Flag	TCP socket connection rejected by remote device

Error Code	Error Flag	Description
16#621A	TCP Socket Error Flag	Disabling TCP socket connection triggered

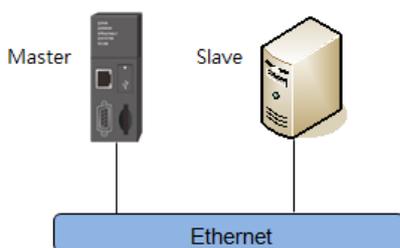
2. The following table explains UDP connection errors:

Error Code	Error Flag	Description
16#2003	SM0	S ₁ or S ₂ exceeds the range
16#600D	SM1100	Ethernet network not connected
16#621A	UDP Socket Error Flag	Disabling UDP Socket connection triggered

5. Examples of AS Series

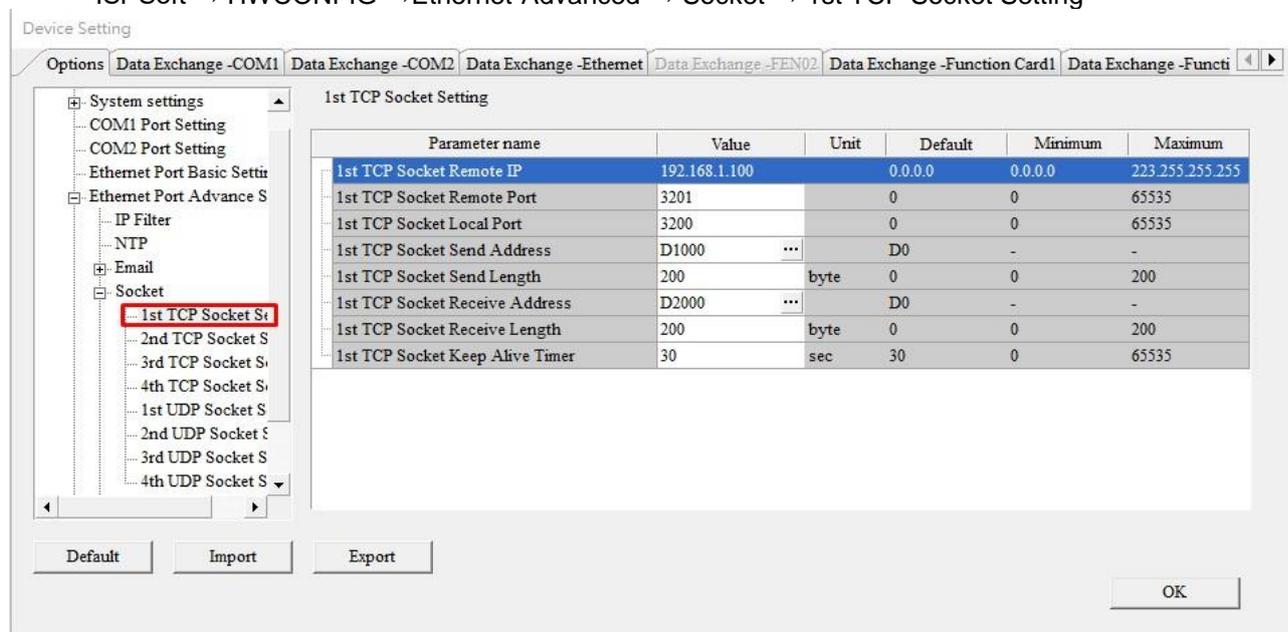
【System Structure】

Role:	AS	PC
Client (Master)	IP : 194.168.1.111	IP : 194.168.1.100
Server (Slave)	Local Port : 3200	Local Port : 3201
	Send Length : 200	
	Send Address : D1000	
	Receive Length : 200	
	Receive Address : D2000	



【Software Settings】

- PLC Setup
 - Ethernet Basic Setting: IP
ISPSOFT → HWCONFIG → Ethernet-Basic
 - Ethernet Advance Setting: Socket
ISPSOFT → HWCONFIG → Ethernet-Advanced → Socket → 1st TCP Socket Setting



The screenshot shows the '1st TCP Socket Setting' window in the ISPSOFT software. The left sidebar shows a tree view with 'Socket' expanded and '1st TCP Socket Setting' selected. The main area contains a table of parameters:

Parameter name	Value	Unit	Default	Minimum	Maximum
1st TCP Socket Remote IP	192.168.1.100		0.0.0.0	0.0.0.0	223.255.255.255
1st TCP Socket Remote Port	3201		0	0	65535
1st TCP Socket Local Port	3200		0	0	65535
1st TCP Socket Send Address	D1000	...	D0	-	-
1st TCP Socket Send Length	200	byte	0	0	200
1st TCP Socket Receive Address	D2000	...	D0	-	-
1st TCP Socket Receive Length	200	byte	0	0	200
1st TCP Socket Keep Alive Timer	30	sec	30	0	65535

Buttons for 'Default', 'Import', 'Export', and 'OK' are visible at the bottom of the window.

【Requirement】

1. Use SM instructions to control sockets. There are altogether 4 groups of sockets and the following is an example of the first group.

TCP Socket Number

TCP Socket Number	Successful connection flag	Data received flag	Data sent flag	Starting connection flag	Closing connection flag	Sending data flag	Error Flag
1	SM1270	SM1271	SM1272	SM1273	SM1274	SM1275	SM1277

UDP Socket Number

UDP Socket Number	Starting connection flag	Data received flag	Data sent flag	Closing connection flag	Error Flag
1	SM1334	SM1335	SM1336	SM1337	SM1338

- The PLC program together with the socket number from Software Setting controls the corresponding flags to execute connection and data transmission.

5.1 AS Series Example 1: TCP Sample Program (S3: 1 assign PLC as Client/PC as Server)

【Steps】

- Set M0 to ON to open socket connection. (See Network 1 below)
- When connection is successful, M0 is OFF. (See Network 2 below)
- If M1 is ON, a PLC sends data from D1000~D1199 (the send data length is 200 in the Socket Setting); write the content of send data in D1000~D1199. The PC receives the send data. (See Network 3 below).

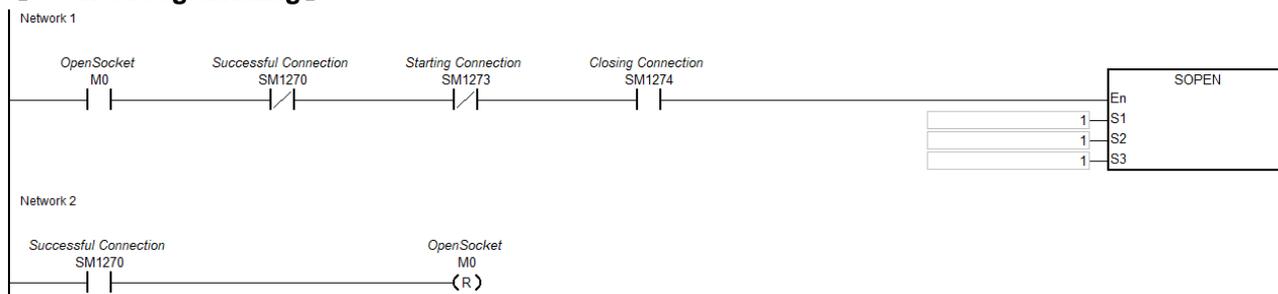
Example: PLC send data content (digital form) → 16#4141, 16#4242, 16#4343, 16#4444, 16#4545
 PC receives (character form) → AA BB CC DD EE

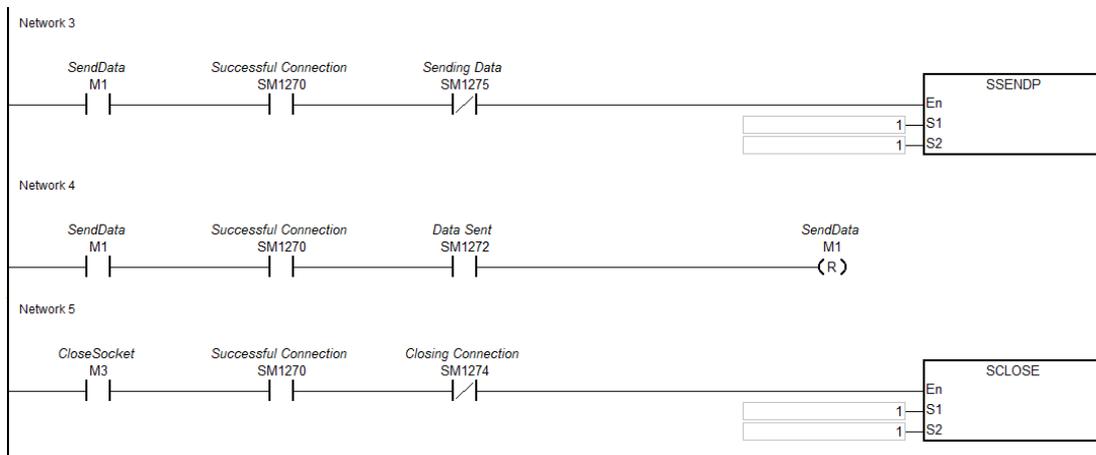
- When the PC send data to a PLC, the PLC receives and places the data in D2000~D2199 (receive data length is set to 200 in Socket Settings).

Example: PC send data content (character form) → AA BB CC DD
 PLC receives (digital form) → 16#4141, 16#4242, 16#4343, 16#4444 (place in D2000, D2001, D2002, D2003 accordingly)

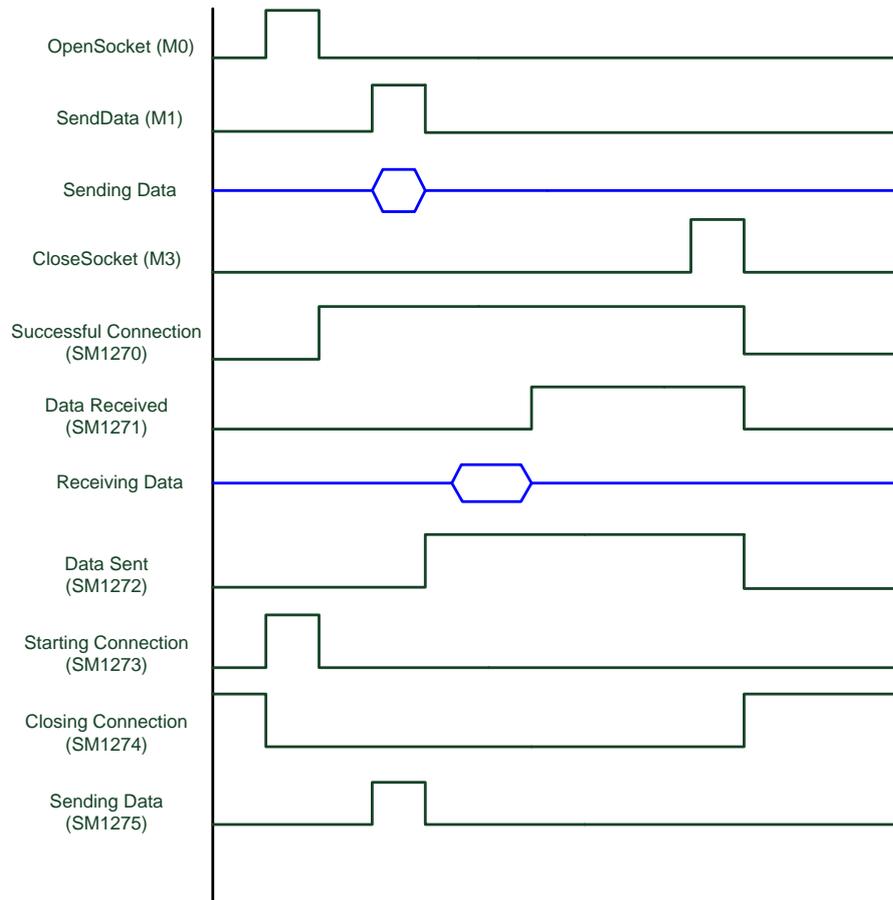
- When data is received, clear send data M1 or M1 is OFF. (See Network 4 below)
- Set M3 to ON to close socket connection. (See Network 5 below)

【Socket Programming】





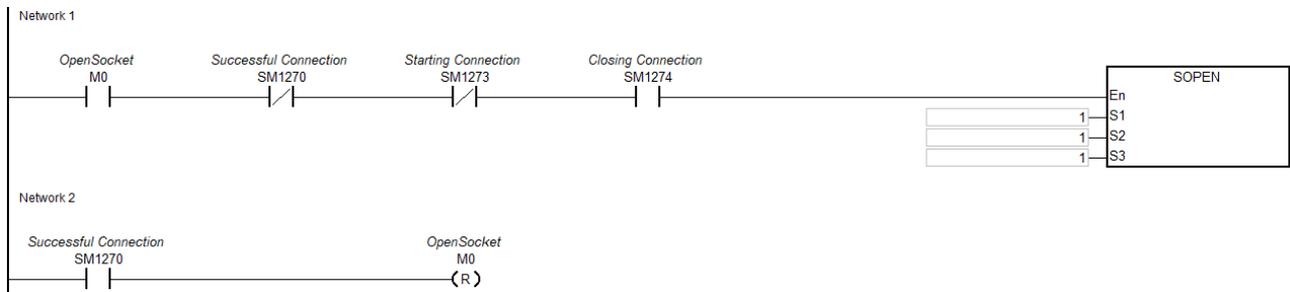
【 Timing Diagram 】



【 Additional Remarks 】

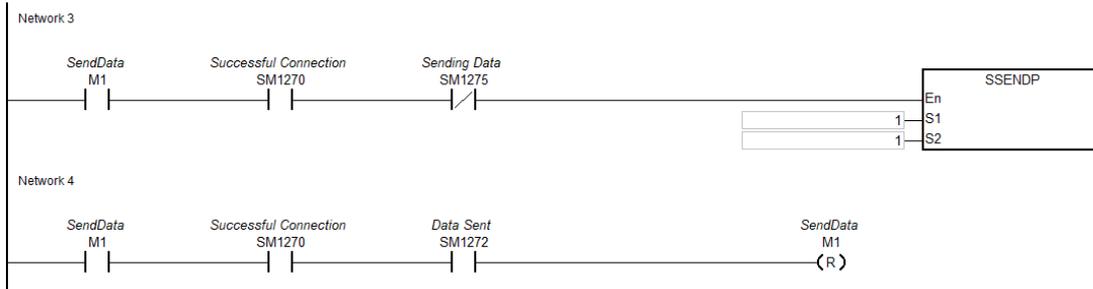
- PLC : TCP Client
PC : TCP Server, wait for client connection

• Network 1:



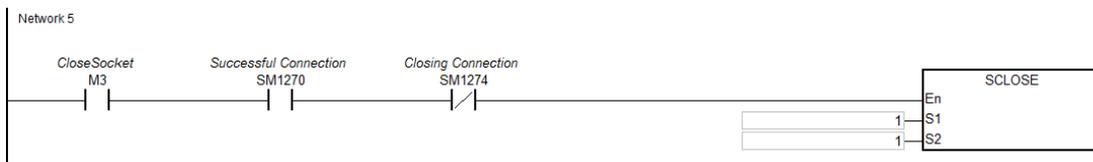
- Before opening the socket (M0) to execute connection, check that successful connection SM1270 is OFF, starting connection SM1273 is OFF and closing connection SM1274 is ON.
- When starting PC's socket connection, wait for the PLC to connect.
- If M0 is ON, the SOPEN instruction executes the starting connection flag SM1273 to ON. Once the connection is successful, SM1270 is ON then clear SM1273 or SM1273 is OFF, which means successful socket connection and clear M0 or M0 is OFF.

• Network 3 :



- Before sending data, please check the data is written in the sending device of HWCONFIG setting.
- When send data M1 is ON, the sending data flag SM1275 is ON.
- When data is successfully sent, SM1272 is ON then clear the sending data flag SM1275 or SM1275 is OFF. To send a new data, we suggest to clear M1 or M1 is OFF.
- When a PC receives data from a PLC and then use it to send data; after PLC receives the data, set data received SM1271 to ON so that PLC programs can determine the flag and handle the received data from the assigned device position in HWCONFIG.

• Network 5 :



- When sending or receiving data is no longer required, set close socket (M3) to ON.
- When closing connection, SM1274 is ON then set other flags to OFF. Note: when error flag SM1277 is ON, users need to clear the flag.
- When SM1274 changes from OFF to ON, clear close socket M3 (or M3 is OFF) so that socket connection will not be closed again once M3 is ON.

5.2 AS Series Example 2: TCP Sample Program (S3: 0 as Server/PC as Client)

【Steps】

1. Set M0 to ON to open socket connection. (See Network 1 below)
2. When connection is successful, M0 is OFF. (See Network 2 below)
3. Set M1 to ON, a PLC sends data from D1000~D1199 (the send data length is 200 in Socket Setting); write the content of send data in D1000~D1199. The PC receives the send data. (See Network 3 below)..

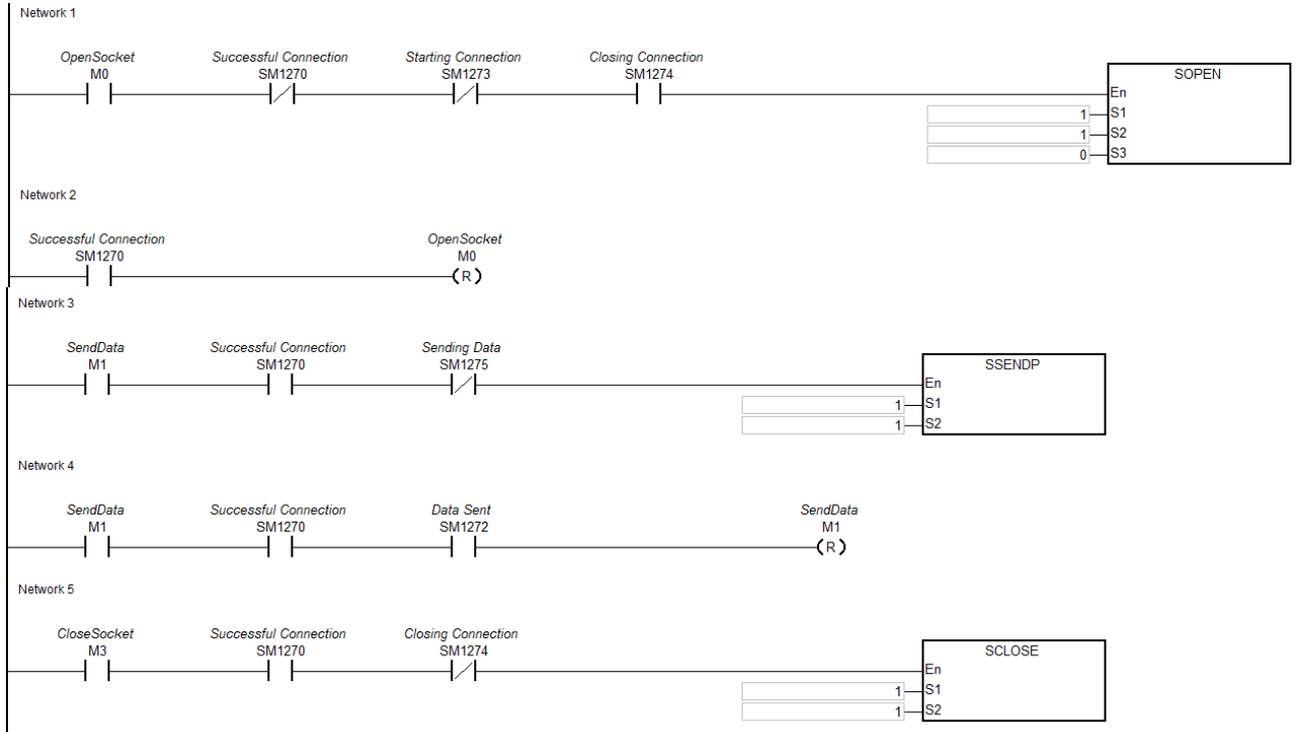
Example: PLC send data content 4141 4242 4343 4444 4545
 PC receives AA BB CC DD EE

4. When the PC send data to a PLC, the PLC receives and places the data in D2000~D2199 (receive data length is set to 200 in Socket Settings).

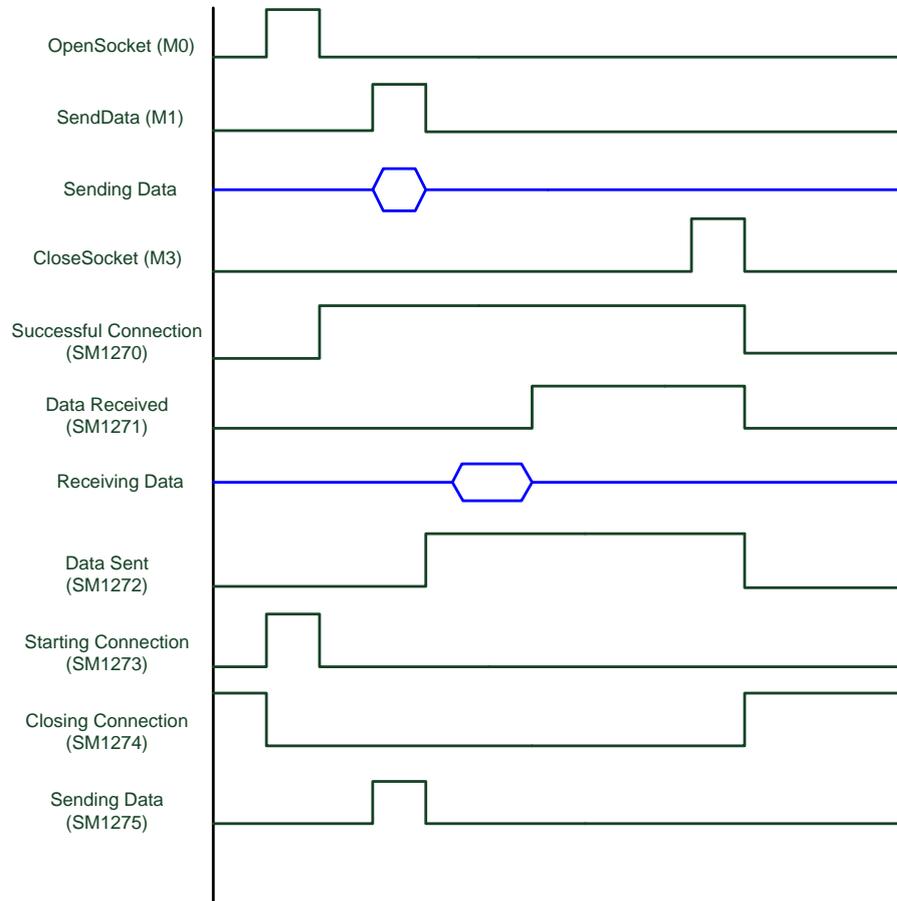
Example: PC send data content AA BB CC DD
 PLC receives 4141 4242 4343 4444 (place in D2000, D2001, D2002, D2003 accordingly)

5. When data is received, clear M1 or M1 is OFF. (See Network 4 below)
6. Set M3 to ON to close socket connection. (See Network 5 below)

【Socket Programming】

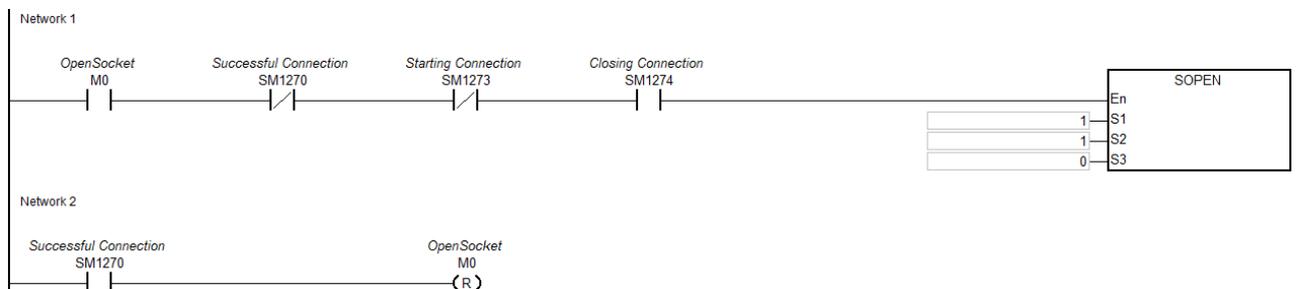


【 Timing Diagram 】



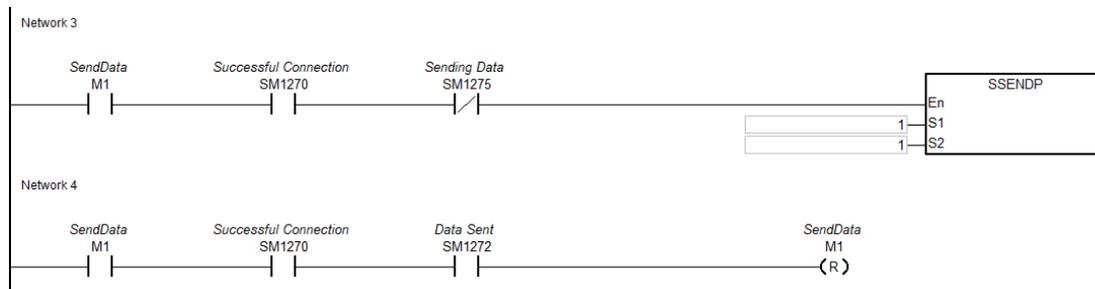
【 Additional Remark 】

- PLC : TCP Server, wait for client to connect
PC : TCP Client
- Network1 :



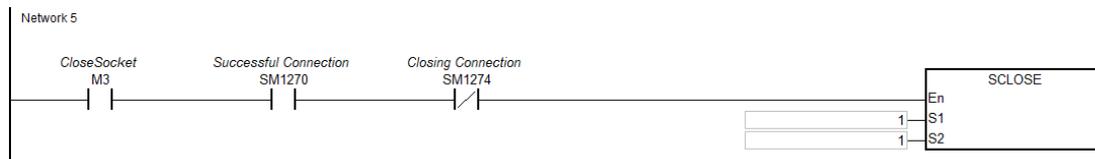
- Before opening the socket (M0) to execute connection, check that successful connection SM1270 is OFF, starting connection SM1273 is OFF and closing connection SM1274 is ON.
- When open socket M0 is ON, the starting connection SM1273 is ON then wait for PC's connection.
- When the PC starting to establish connection, SM1270 is ON then clear SM1273 or SM1273 is OFF. This indicates successful socket connection and M0 is OFF.

• Network3 :



- Before sending the data, please check the data is written in the sending device of HWCONFIG setting.
- When send data M1 is ON, the sending data flag SM1275 is ON.
- When data is successfully sent, SM1272 is ON then clear the sending data flag SM1275 or SM1275 is OFF. To send a new data, we suggest to clear M1 or M1 is OFF.
- When a PC receives data from a PLC and then use it to send data; after the PLC receives the data, set data received SM1271 to ON so that PLC programs can determine the flag and handle the received data from the assigned device position in HWCONFIG.

• Network 5 :



- When sending or receiving data is no longer required, set close socket (M3) to ON.
- When closing connection, SM1274 is ON then set other flags to OFF. Note: when error flag SM1277 is ON, users need to clear the flag.
- When SM1274 changes from OFF to ON, clear close socket M3 (or M3 is OFF) so that socket connection will not be closed again once M3 is ON.

5.3 AS Series Example 3: UDP Sample Program

【Steps】

1. Set M4 to ON to open socket connection. (See Network 1 below)
2. Set M5 to ON, a PLC sends data from D1000~D1199 (the send data length is 200 in Socket Setting); write the content of send data in D1000~D1199. The PC receives the send data. (See Network 3 below).

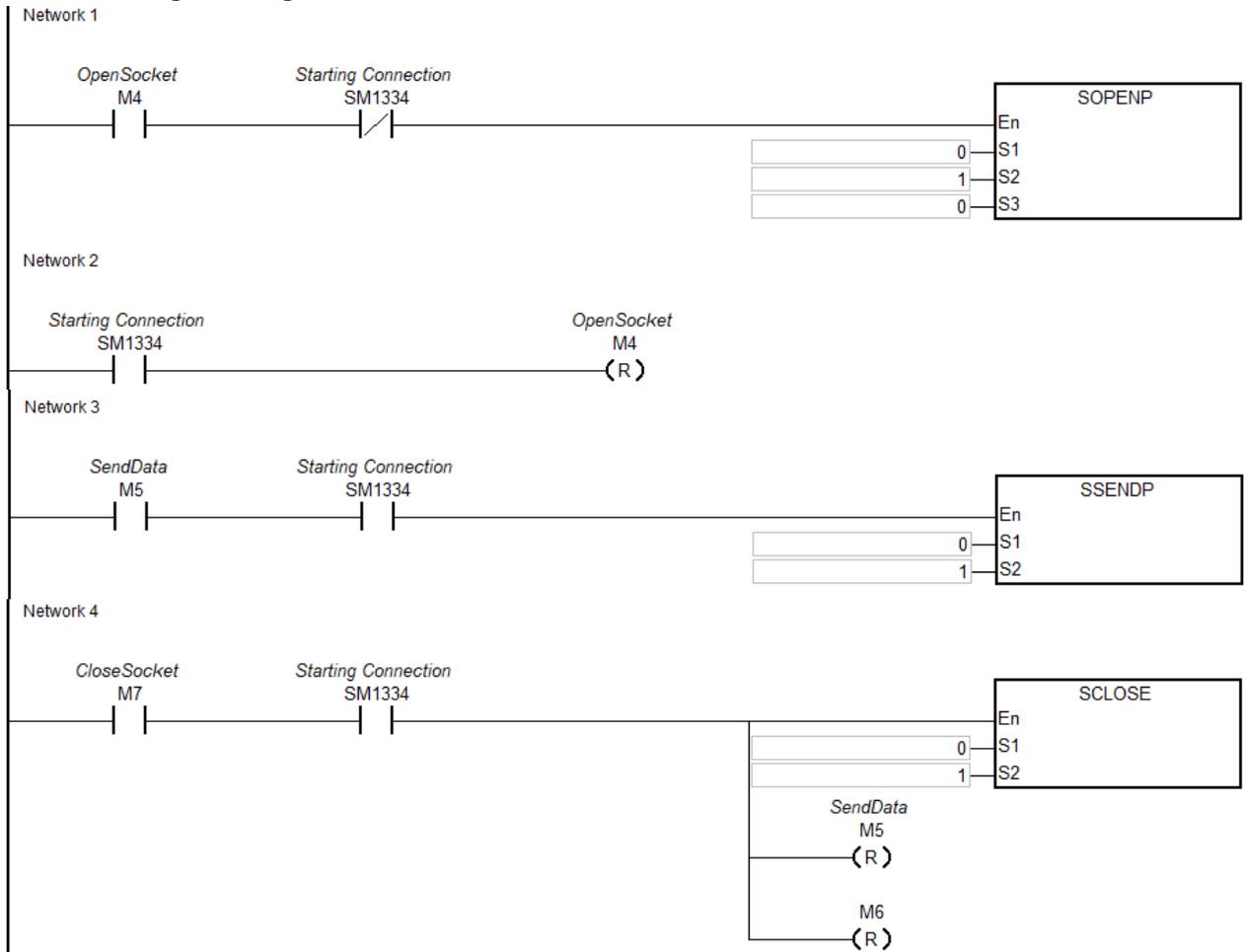
Example: PLC send data content 4141 4242 4343 4444 4545
 PC receives AA BB CC DD EE

3. When the PC send data to a PLC, the PLC receives and places the data in D2000~D2199 (receive data length is set to 200 in Socket Settings).

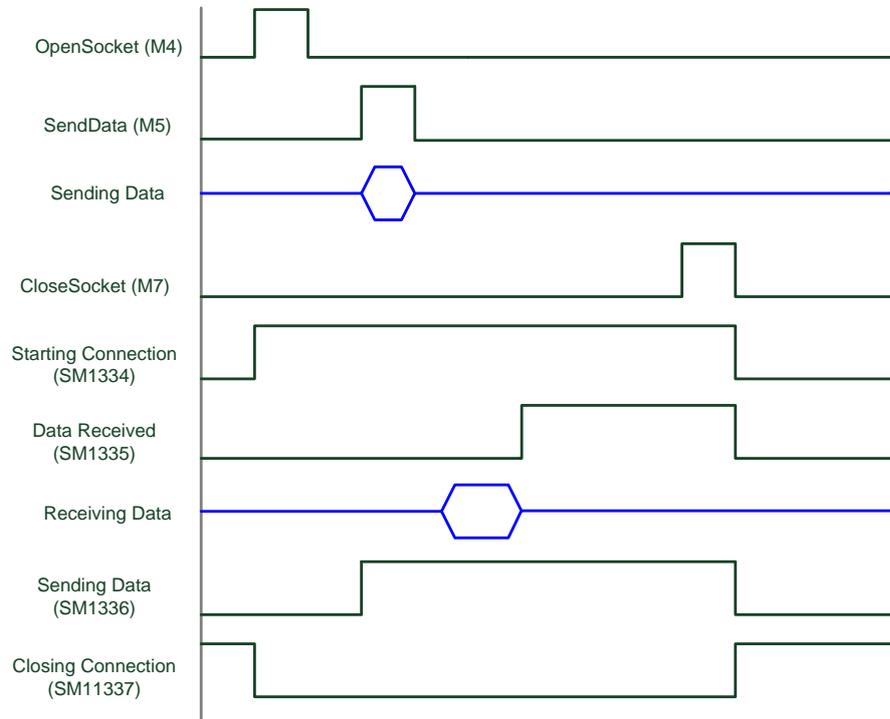
Example: PC send data content AA BB CC DD
 PLC receives 4141 4242 4343 4444 (place in D2000, D2001, D2002, D2003 accordingly)

4. Set M7 to ON to close socket connection. (See Network 4 below)

【 Socket Programming 】



【 Timing Diagram 】

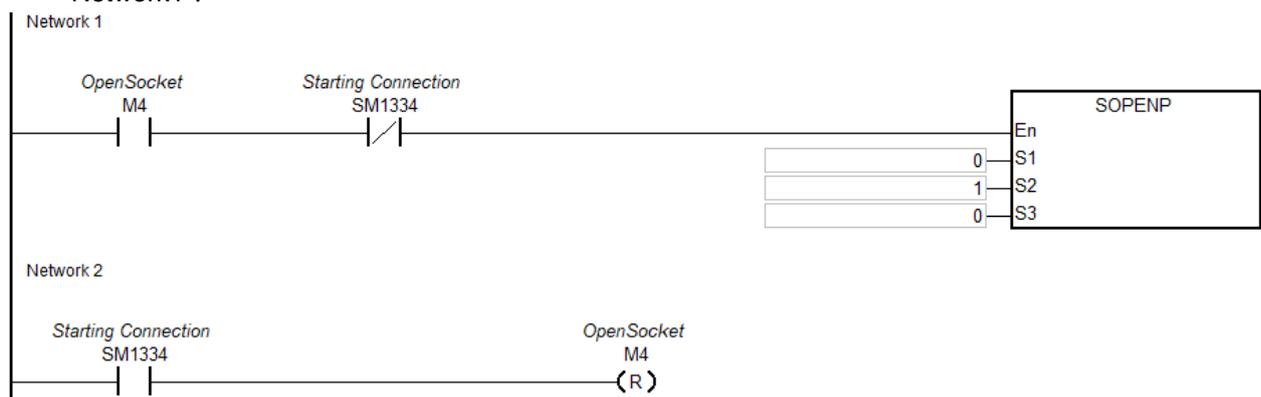


【 Additional Remark 】

• **Timing Diagram :**

UDP mode does not have Server/Client problem. Both sides need to open UDP socket for data transmission.

• **Network1 :**



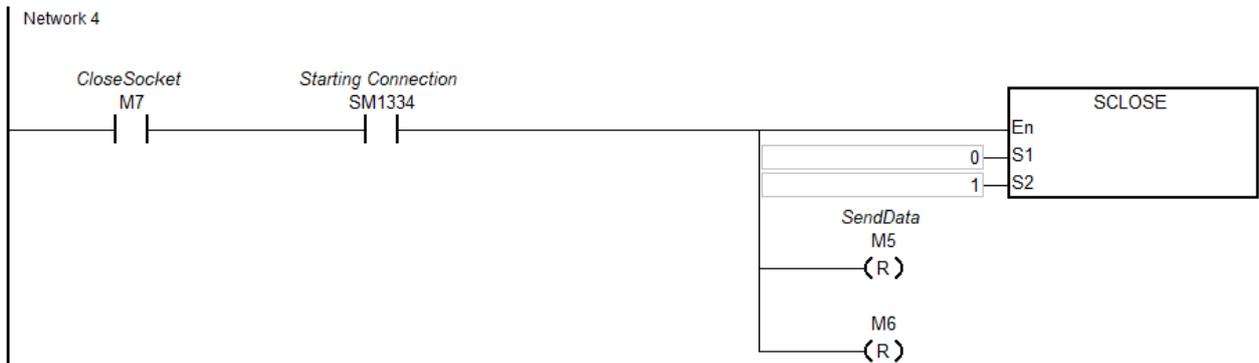
- Before opening a socket (M4), check starting connection SM1334 is OFF.
- When a UDP port is opened on the PC and a socket is opened (M4 is ON) on the PLC, then starting connection SM1344 is ON, meaning both side connection is successful.

• Network3 :



- Before sending data, please check the data is written in the sending device under HWCONFIG setting.
- When M5 is ON, the data is sending.
- When data is successfully sent, SM1336 is ON. To send a new data, we suggest to clear M5 or M5 is OFF.
- When a PC receives data from a PLC and then use it to send data; after the PLC receives the data, set data received SM1335 to ON so that PLC programs can determine the flag and handle the received data from the assigned device position in HWCONFIG.

• Network4 :



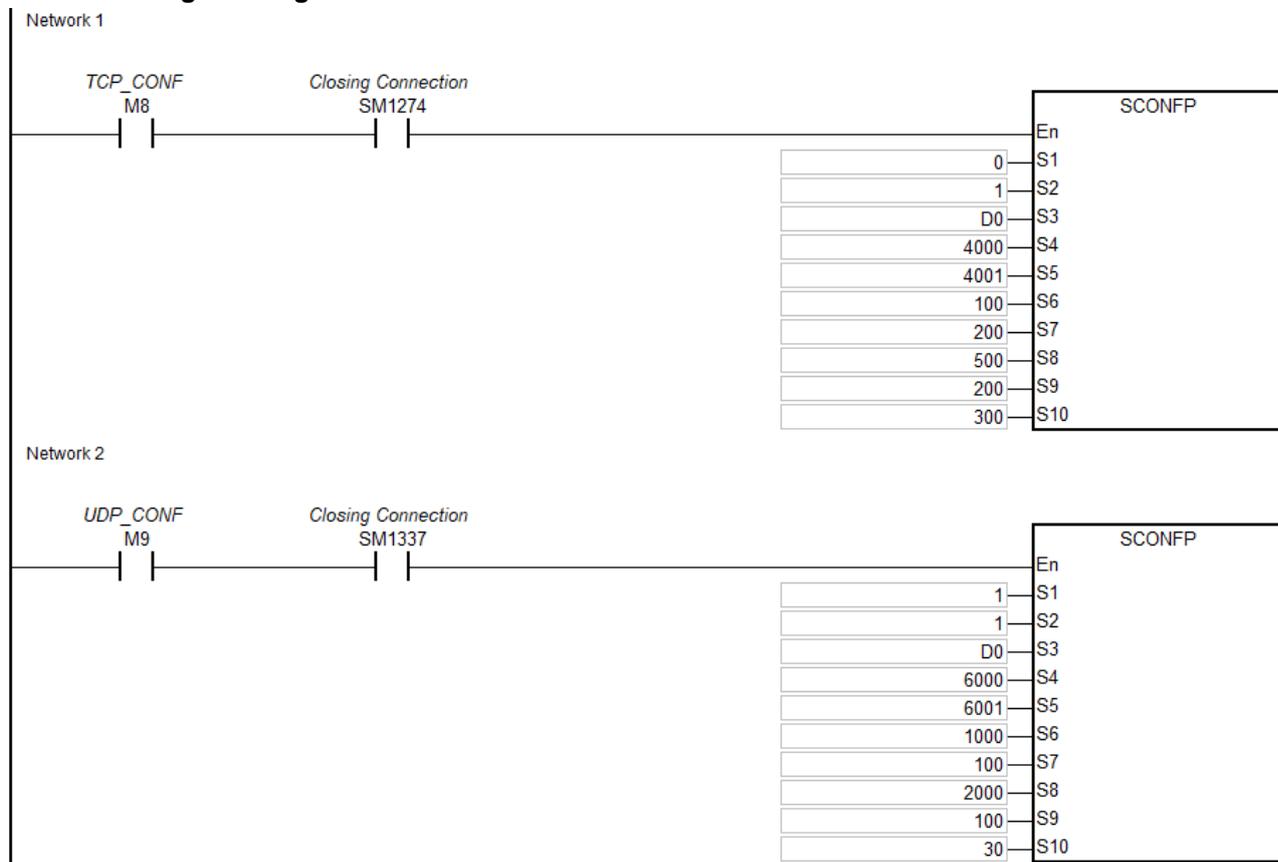
- When sending or receiving data is no longer required, set M7 to ON to close socket.
- When SM1337 is ON, connection is closed then set other flags to OFF. Note: When error flag SM1338 is ON, users need to clear the flag.
- When SM1337 changes from OFF to ON, clear close socket M7 (or M7 is OFF) so that socket connection will not be closed again once M7 is ON.

5.4 AS Series Example 4: SCONF Sample Program

【Steps】

1. When a PLC starts (PLC RUN), users can modify TCP Socket Number 1 setting content. (See Network 1 below)
2. When a PLC starts (PLC RUN), users can modify UDP Socket Number 1 setting content. (See Network 2 below)

【 Socket Programming 】



【 SCONF Instructions 】

Device	Name	Description	Data Type	Remarks
S ₁	Select TCP/UDP	0: TCP, 1: UDP	WORD	
S ₂	Socket number	Range: 1 to 4	WORD	
S ₃	Remote IP address	The first two sections of the IP address occupy the first word and the remaining two sections of the IP address occupy the second word. For example, if the IP address is 192.168.1.5, S ₃ =16#C0A8 and S ₃ +1=16#0105.	WORD[2]	Occupies two consecutive words
S ₄	Remote port	Range: 0-65535; 0 indicates any port	WORD	
S ₅	Local port	Range: 0-65535; 0 indicates any port	WORD	
S ₆	Register where sent data came from	Specifies the number of a D device. Range: 0-29999. Example: The setting value 100 means S ₇ bytes of data are sent from the registers starting at D100 (from the low byte to the high byte).	WORD	
S ₇	Size of sent data	Maximum: 200 bytes	WORD	
S ₈	Register where received data is	Specifies the number of a D device. Range: 0-29999. Example: The setting value 200 means	WORD	

Device	Name	Description	Data Type	Remarks
	stored	S₈ bytes of data are received and stored in the registers starting at D200 (from the low byte to the high byte).		
S₉	Size of received data	Maximum: 200 bytes	WORD	
S₁₀	Connection time	Range: 1–30000, unit: second	WORD	Applicable to TCP mode only

【 Device 】

S₃ remote IP address, PC IP= 192.168.1.111

D0=16#C0A8 · D1=16#016F

【 Additional Remark 】

1. Network1 includes modified content of TCP Socket Number 1, remote IP address: 192.168.1.111, remote port is 4000, local port is 4001, the data sent from registers starting at D100, size of data is 200 bytes; receives and stores in registers starting at D500, size of data is 200 bytes and connection time is 300 seconds.
2. When modifying parameters, please check socket connection is closed. Also, confirm closing connection SM1274 is ON and execute TCP_CONF (M8 is ON) to ensure successful parameter modification.
3. Network2 includes modified content of UDP Socket Number 1, remote IP address: 192.168.1.111, remote port is 6000, local port is 6001, the data sent from registers starting at D1000, size of data is 100 bytes; receives and stores in registers starting at D2000, size of data is 100 bytes and connection time is 30 seconds.
4. When modifying parameters, please check socket connection is closed. Also, confirm closing connection SM1337 is ON and execute UDP_CONF (M9 is ON) to ensure successful parameter modification.