Remote Controlling SmartGen Controller

Step 1 - Referring the manuals and datasheets of Generator (Sollant GenSet) and the Control Panel(SmartGen)

2 NAMING CONVENTION AND MODEL COMPARISON

2.1 NAMING CONVENTION

Exact model that we have
HGM7210CAN

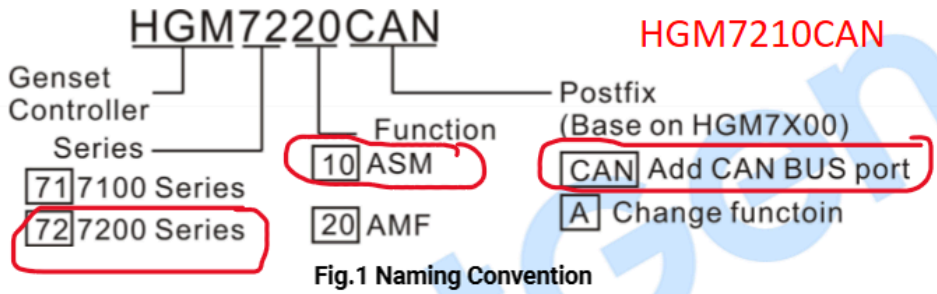


Fig.1 Naming Convention

NOTE: Please contact with our qualified personnel for more information about the postfix descriptions.

2.2 MODEL COMPARISON

Table 3 Model Comparison

Items	HGM7220	HGM7210	HGM7220CAN	HGM7210CAN
Digital Input Port	7	7	7	7
Relay Output port	8	8	8	8
Sensor number	5	5	5	5
AMF	●		●	
RS485	●	●	●	●
GSM	●	●	●	●
CAN (J1939)			●	●
USB	●	●	●	●
Real-time clock	●	●	●	●
Event log	●	●	●	●

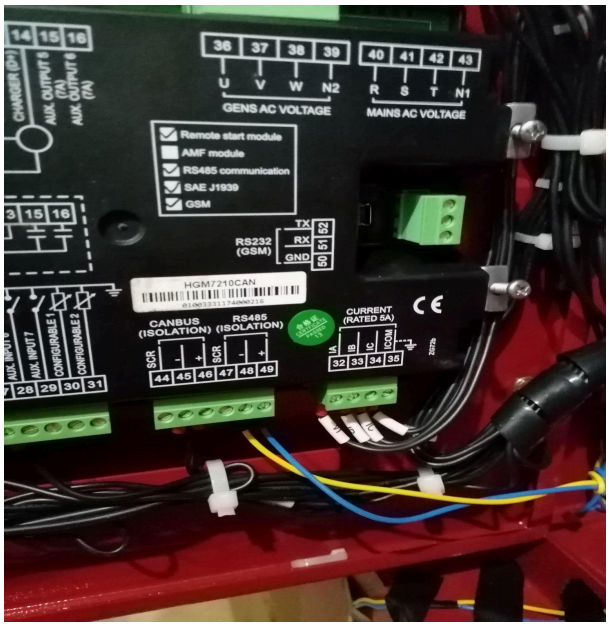
HGM7X10: Auto Start Module, controls genset to start or stop automatically by remote start signal.
HGM7X20: Auto Main Failure, updates based on HGM7X10, especially for automatic system composed by generator and mains.

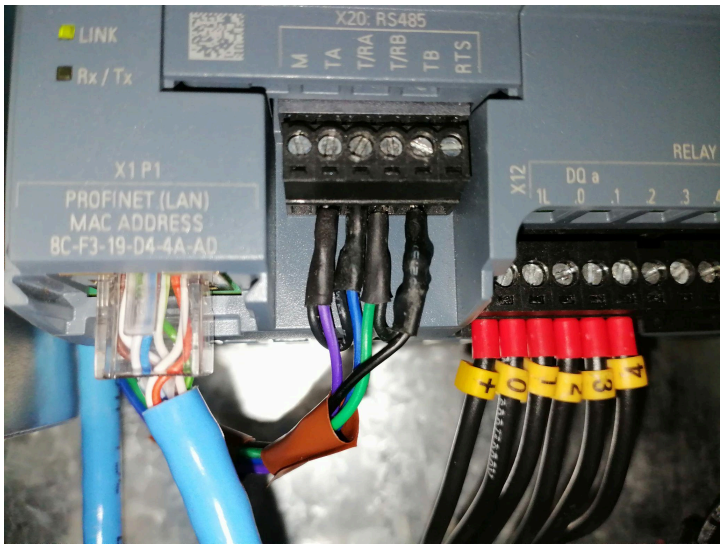
To enable remote control of the Sollant GenSet generator using the SmartGen control panel, the following key observation was made:

- The generator must first be switched to **Manual Mode**.
- Once in Manual Mode, the generator can be turned ON and OFF using remote control commands.

Step 2- Connecting the S7-1214 PLC with the Generator through RS485 to enable Modbus Communication

To facilitate Modbus communication between the generator and the S7-1214 PLC, the RS485 interface was used. This connection enables both data exchange and control commands.





Step 3 - Preparing the Databases referring to the SmartGen Controller Communication Protocols

Based on the SmartGen Controller Communication Protocols, two databases were prepared and integrated into TIA Portal to handle the required Modbus Function Codes:

- **Function Code 03H** (Read Holding Registers): Used for data logging from the generator. The data was mapped to data blocks named `GenSet_n` (where n = 1 to 12).
- **Function Code 05H** (Write Single Coil): Used for sending remote control commands. These were stored in the `GenSet_Control_DB` data block.

Attached here are the databases created to be included in the tia portal

SmartGen Controller Address database.xlsx

This protocol describes read and write command format of RS485 half-duplex serial port communication and definition of internal information data for the third-party to develop and use.

The controller is used as a slave, using Modbus-RTU protocol, and does not support other protocols such as Modbus-ASCII.

Communication address: 1~254 (default: 1)
Baud rate: 2400/4800/9600/19200bps (default: 9600bps)
Start bit: 1-bit
Data bit: 8-bit
Parity bit: No/Odd/Even Parity (default: no parity)
Stop bit: 1 or 2 bits (default: 2-bit)

Supported function code: 03H, 05H, 06H. Function code 03H is used for reading controller alarm, status information and various electricity data; function code 05H is used for sending remote command; while function code 06H is used for saving single point data in device register.

Data check mode: CRC16.

Internal registers of controller are in the unit of "word (double bytes)".

Communication timeout period: over 200ms.

Communication distance: 9600 baud rate, the longest distance can reach 1,000m when using 120Ω shielding twisted pair.

Once maximum 120 data of word register can be read.

Up to 32 controllers can be connected together for network communication.

When RS485 is connected, 120Ω twisted pair with shielding layer shall be used, and the shielding layer shall be grounded at one end.

Step 4 - Setting the Generator as a slave and configuring it

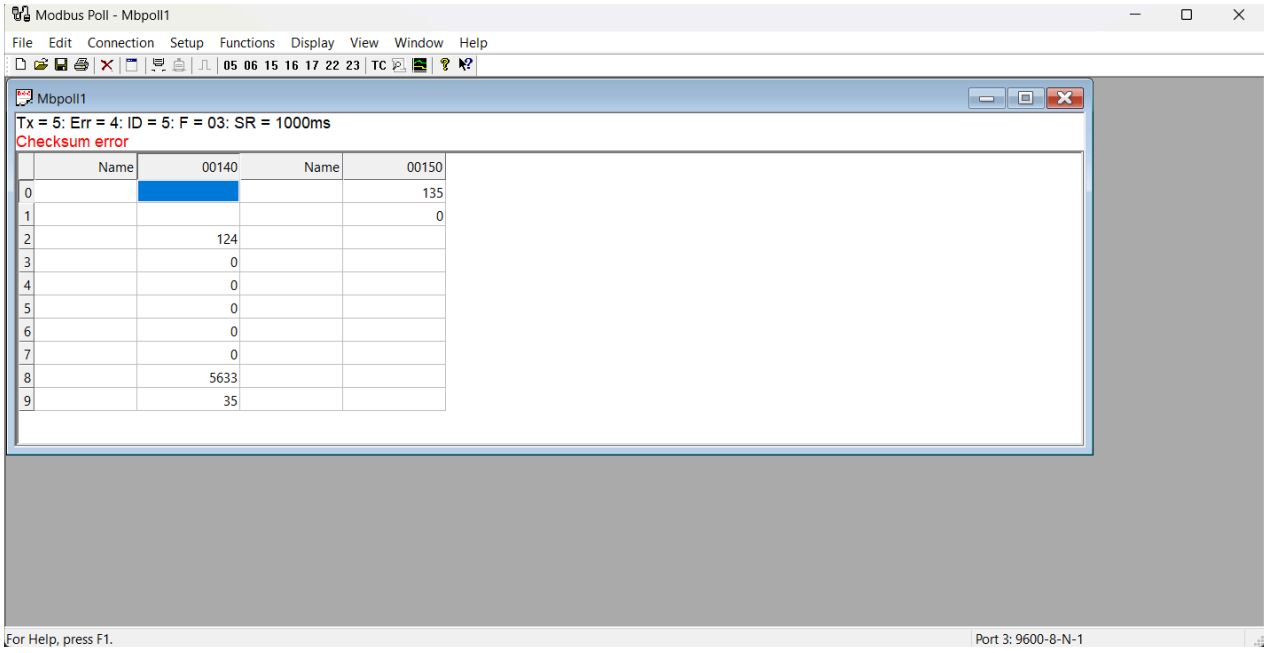
By accessing the control panel the generator was checked for its configuration (It was by default in the required configuration)

Slave Address - 5
Baud rate - 9600
Parity - None
Start Bit - 1
Stop Bit - 2

Step 5 - Checking through direct PC to Generator connection via Modbus

The PC was connected to the Generator through **USB - RS485** converter and configured through **Modbus Poll**. The configurations were done as follows to be synchronized with the generator.

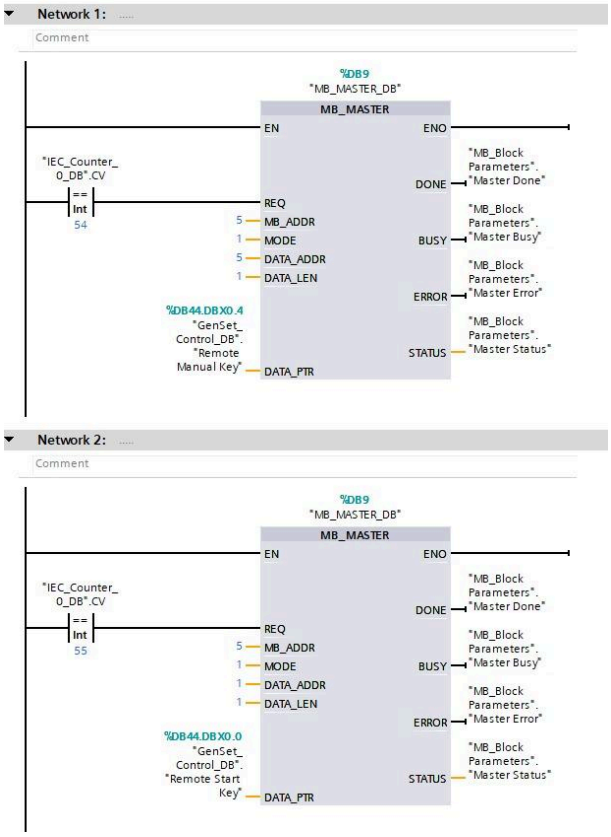
Slave Address - 5
Baud rate - 9600
Parity - None
Start Bit- 1
Stop Bit - 2

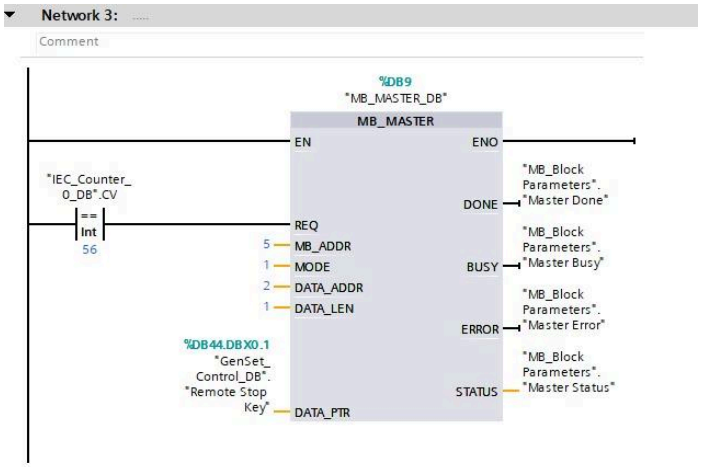


In this step, when the test mode was enabled and then Remote Start Key was turned 1(True) , the generator was turned ON , while it was turned OFF when Remote Stop Key was turned 1(True).

Step 6 - Controlling the Generator through commands from tia portal

The following data blocks were created to give the remote commands through tia portal ;





The Generator was turned ON and turned OFF remotely by following the steps mentioned below in order ;

1. Switch to manual mode - Toggle the value of **Remote Manual Key** True

GenSet_Control_DB

	Name	Data type	Offset	Start value	Monitor value	Retain	Accessible f...	Writa...	Visible in ...	Setpoint	Comment
1	Static										
2	Remote Start Key	Bool	0.0	false	FALSE		☑	☑	☑		
3	Remote Stop Key	Bool	0.1	false	FALSE		☑	☑	☑		
4	Remote Test Key	Bool	0.2	false	FALSE		☑	☑	☑		
5	Remote Auto Key	Bool	0.3	false	FALSE		☑	☑	☑		
6	Remote Manual Key	Bool	0.4	false	TRUE		☑	☑	☑		

2. Turning On - Toggle the value of **Remote Start Key** True

GenSet_Control_DB

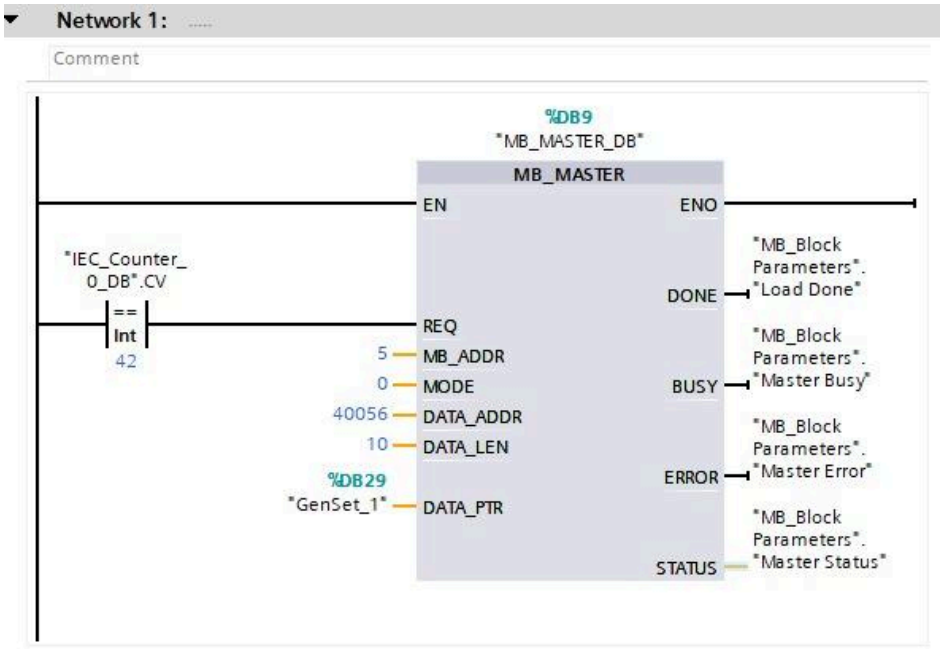
	Name	Data type	Offset	Start value	Monitor value	Retain	Accessible f...	Writa...	Visible in ...	Setpoint	Comment
1	Static										
2	Remote Start Key	Bool	0.0	false	TRUE		☑	☑	☑		
3	Remote Stop Key	Bool	0.1	false	FALSE		☑	☑	☑		
4	Remote Test Key	Bool	0.2	false	FALSE		☑	☑	☑		
5	Remote Auto Key	Bool	0.3	false	FALSE		☑	☑	☑		
6	Remote Manual Key	Bool	0.4	false	FALSE		☑	☑	☑		

3. Turning Off - Toggle the value of **Remote Stop Key** True

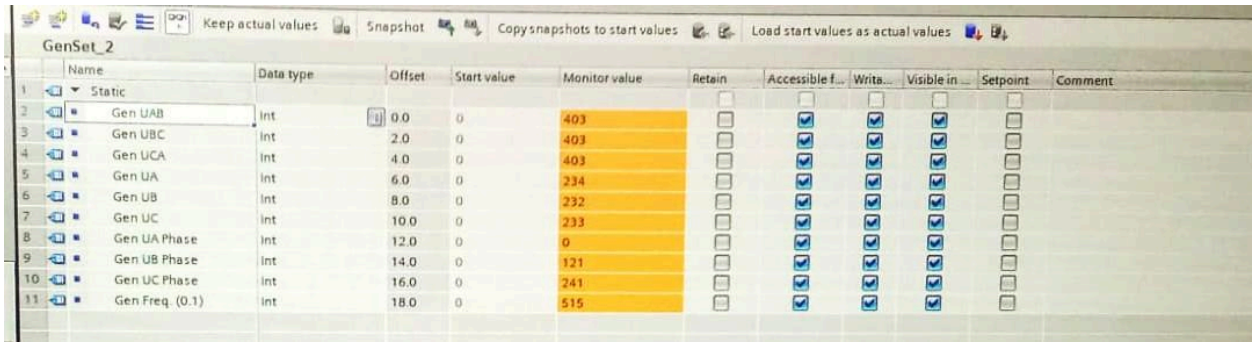
GenSet_Control_DB

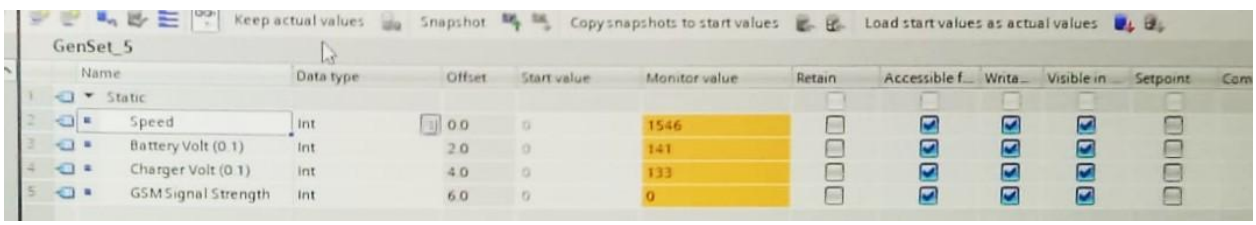
	Name	Data type	Offset	Start value	Monitor value	Retain	Accessible f...	Writa...	Visible in ...	Setpoint	Comment
1	Static										
2	Remote Start Key	Bool	0.0	false	FALSE		☑	☑	☑		
3	Remote Stop Key	Bool	0.1	false	TRUE		☑	☑	☑		
4	Remote Test Key	Bool	0.2	false	FALSE		☑	☑	☑		
5	Remote Auto Key	Bool	0.3	false	FALSE		☑	☑	☑		
6	Remote Manual Key	Bool	0.4	false	FALSE		☑	☑	☑		
7	Remote Mains C/O Key	Bool	0.5	false	FALSE		☑	☑	☑		

Generator Data Collection



Collecting the data from GenSet_1 to GenSet_12 data blocks using similar MB_Master blocks





By following the above outlined steps, the Sollant GenSet generator was successfully controlled remotely via the SmartGen controller using Modbus communication. The integration of the S7-1214 PLC allowed seamless remote operation and real-time data logging.