



MULTI-LINE 2



Option G9 CANshare

- Description of option
- Functional description



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1. Delimitation

1.1 Scope of option

1.1.1 Option G9

This description of options covers the following products:

Product	Software
PPU-3	SW version 3.08.0 or later
GPC-3	SW version 3.08.0 or later

2. General information

2.1 Warnings, legal information and safety

2.1.1 Warnings and notes

Throughout this document, a number of warnings and notes with helpful user information will be presented. To ensure that these are noticed, they will be highlighted as follows in order to separate them from the general text.

Warnings



DANGER!

Warnings indicate a potentially dangerous situation, which could result in death, personal injury or damaged equipment, if certain guidelines are not followed.

Notes



INFO

Notes provide general information, which will be helpful for the reader to bear in mind.

2.1.2 Legal information and disclaimer

DEIF takes no responsibility for installation or operation of the generator set. If there is any doubt about how to install or operate the engine/generator controlled by the Multi-line 2 unit, the company responsible for the installation or the operation of the set must be contacted.



INFO

The Multi-line 2 unit is not to be opened by unauthorised personnel. If opened anyway, the warranty will be lost.

Disclaimer

DEIF A/S reserves the right to change any of the contents of this document without prior notice.

The English version of this document always contains the most recent and up-to-date information about the product. DEIF does not take responsibility for the accuracy of translations, and translations might not be updated at the same time as the English document. If there is a discrepancy, the English version prevails.

2.1.3 Safety issues

Installing and operating the Multi-line 2 unit may imply work with dangerous currents and voltages. Therefore, the installation should only be carried out by authorised personnel who understand the risks involved in working with live electrical equipment.



DANGER!

Be aware of the hazardous live currents and voltages. Do not touch any AC measurement inputs as this could lead to injury or death.

2.1.4 Electrostatic discharge awareness

Sufficient care must be taken to protect the terminals against static discharges during the installation. Once the unit is installed and connected, these precautions are no longer necessary.

2.1.5 Factory settings

The Multi-line 2 unit is delivered from the factory with default settings. These are not necessarily correct for the engine/generator set. Check all the settings before running the engine/generator set.

3. Description of option and terminals

3.1 Description of option

3.1.1 Option G9

Option G9 is a hardware option that gives the possibility of load sharing using a CAN bus between two or more gensets. The G9 hardware must be placed in slot #8 in the DEIF Multi-line 2 unit.

3.2 Terminals

3.2.1 Terminal description

The G9 CAN bus interface for the internal communication between the units is placed in slot #8.

Terminal	Function	Description
126	Not used	
127	Not used	
128	CAN-H	
129	GND	CAN bus interface for load sharing
130	CAN-L	
131	Not used	
132	Not used	
133	Not used	



INFO

We recommend to mount 120 ohm end resistors on the CANshare line, otherwise the CANshare supervision will not work properly. The resistors should be mounted between terminals 128 and 130.

4. Functional description

4.1 Reference

4.1.1 Further information



DANGER!

Refer to the Designer's Reference Handbook for information about standard functions not relating to the CANshare option.

4.2 CANshare with supervision

4.2.1 Description of function

CANshare is the possibility to load share using a CAN bus between two or more gensets. When gensets are load sharing, they are equally dividing a common load, which means that they – relative to their nominal power – each provide a certain percent of the total load.

Using a CAN bus to load share makes it possible to add supervision to the load share line. This is done by uniquely identifying each genset with an ID, which the user manually types into the controller (display, Modbus or USW). Each genset controller on the CAN bus line then remembers which IDs are active, and if an ID is missing (or represented more than once), an alarm is given.

The system can also be divided into multiple CANshare sections. When divided into sections, the unit will only load share with units in the specific CANshare section. Each genset can be configured with a section ID, or through breaker feedbacks and M-Logic the system can control the section IDs. The section ID can also be written manually with Modbus communication.

Examples of the CANshare with changing section IDs:

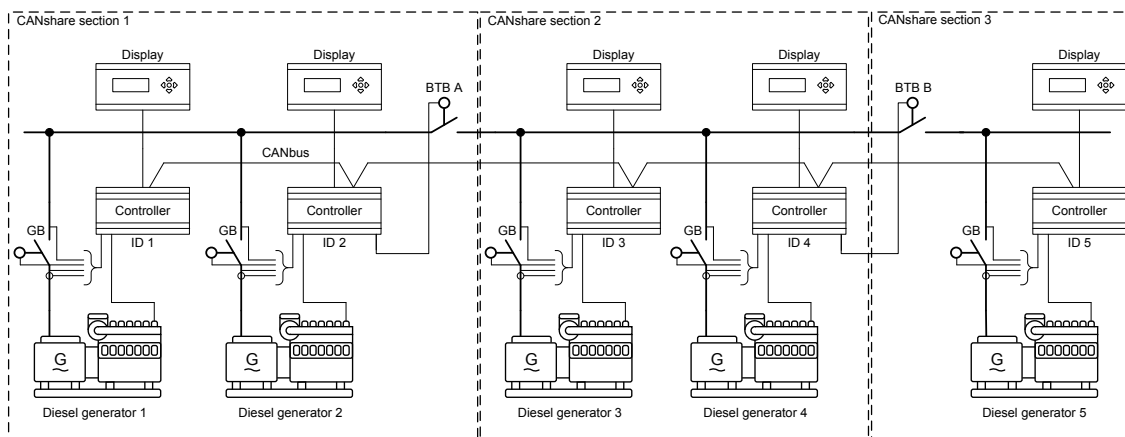


Figure 1 shows an example of the load sharing system with three sections and unique ID for each unit.

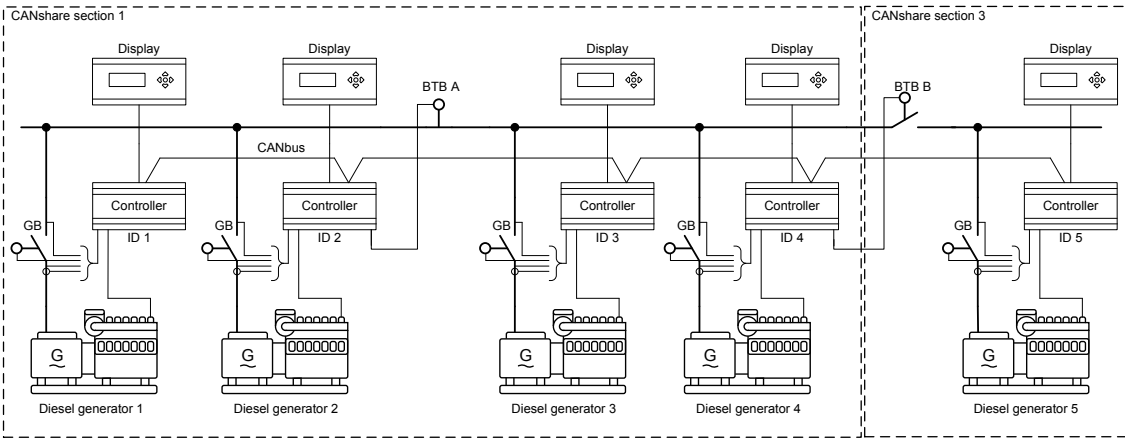


Figure 2 shows the same system as above, but with a closed BTB A. The result is a change of section for ID3 and ID4.

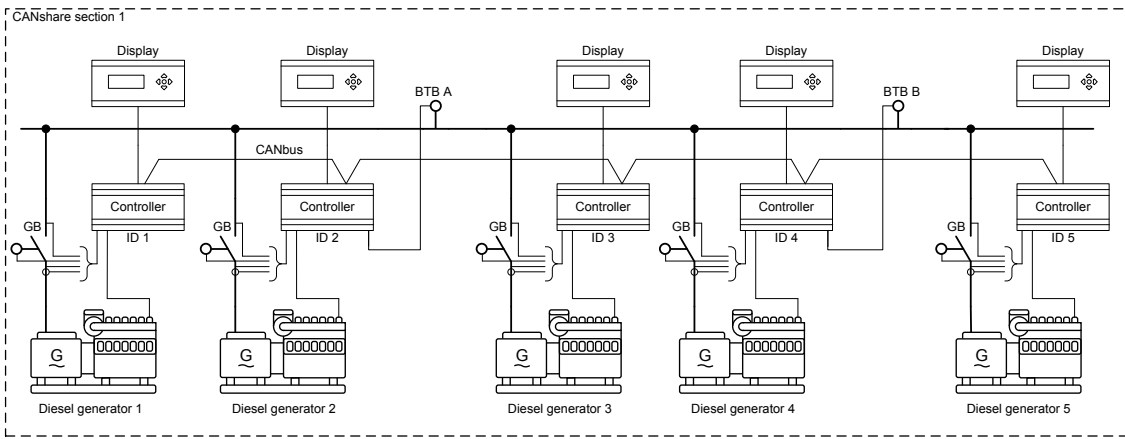


Figure 3 shows the same system as above, but with two closed BTBs. The result is a change of section for ID5. Now all units are in the same section.

4.2.2 Breaker feedbacks

The CANshare system has the possibility to divide the load sharing system into sections. The CANshare system can automatically change the load sharing sections depending on the breaker positions, but this requires feedback from the breakers. Breaker feedback from the BTB or BTBs is broadcast through the CAN bus communication, so it is only required to wire each BTB to one of the units.

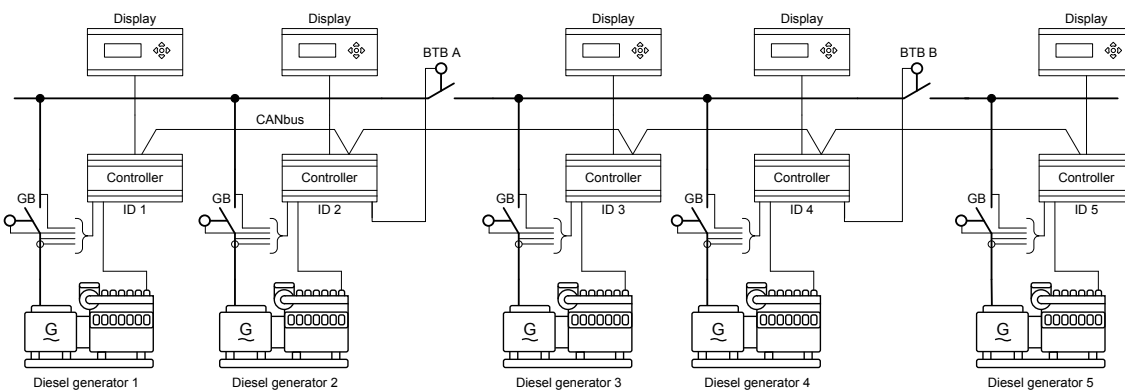


Figure 4 shows a possible wiring setup with five gensets and two BTBs

The breaker feedback is set up using the DEIF utility software. The USW can be downloaded from www.deif.com.

Breaker feedbacks are configured in the input/output menu. This menu can be accessed via the icon with a green and red arrow pointing in opposite directions. After activating the icon, the menu shown to the right will appear.

If the closed feedback from BTB B is wired to input 26, you select "Dig. input 26. Term 26" in the list. Open feedback means that the BTB is off and a closed BTB is on.

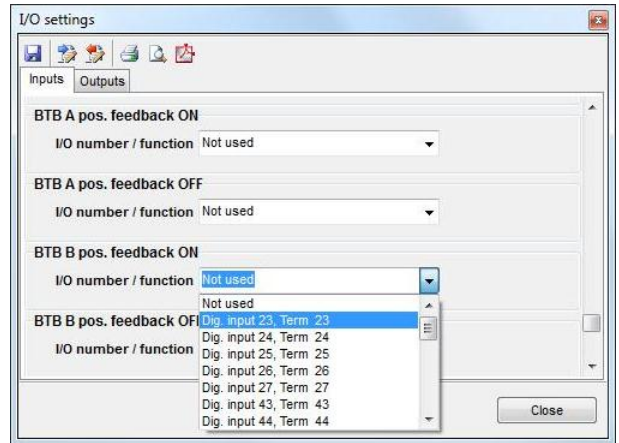


Image 1- Input/output menu from the DEIF utility software version 3.30

When the BTB feedbacks have been configured, the BTB position feedback alarm is activated automatically. If the unit detects missing feedback on both inputs, feedback on both inputs at the same time or if only one feedback is configured, an alarm is raised. The BTB position alarm is only raised on the units with the wired feedbacks.



INFO

For each BTB, both the ON and OFF feedback must be configured. If not, a "BTB position fail" alarm will be activated.

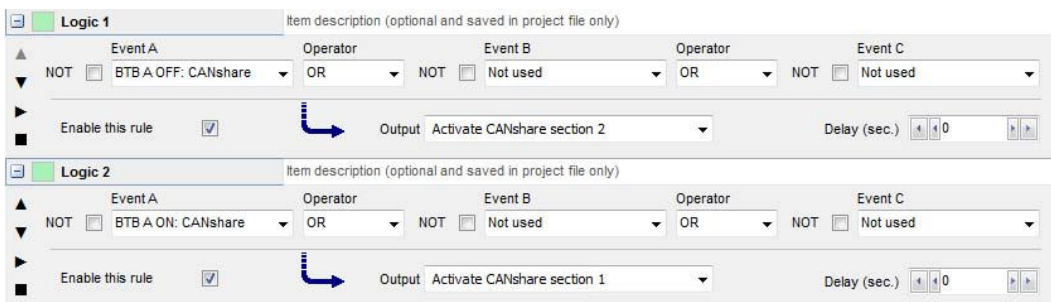
4.2.3 M-Logic for CANshare sections

Using M-Logic, the unit can automatically change the section ID when a breaker is opened or closed. M-Logic is set up for each unit when configuring the system, and based on the breaker feedbacks the CANshare sections are activated. For units where the section ID is based on M-Logic it is important to set parameter 7852 to M-Logic.

M-Logic for the above CANshare examples:

Units 1 and 2 are always in CANshare section 1, so no M-Logic is needed on those units. Select section 1 in parameter 7852.

M-Logic for units 3 and 4:



M-Logic for unit 5:

Logic 3
Item description (optional and saved in project file only)

Event A: NOT BTB A OFF: CANshare
Operator: AND
Event B: NOT BTB B OFF: CANshare
Operator: OR
Event C: NOT Not used

Enable this rule: Output: Activate CANshare section 3 Delay (sec.): 0

Logic 4
Item description (optional and saved in project file only)

Event A: NOT BTB A OFF: CANshare
Operator: AND
Event B: NOT BTB B ON: CANshare
Operator: OR
Event C: NOT Not used

Enable this rule: Output: Activate CANshare section 2 Delay (sec.): 0

Logic 5
Item description (optional and saved in project file only)

Event A: NOT BTB A ON: CANshare
Operator: AND
Event B: NOT BTB B ON: CANshare
Operator: OR
Event C: NOT Not used

Enable this rule: Output: Activate CANshare section 1 Delay (sec.): 0

4.2.4 CAN bus failure handling

When a unit is connected to the CAN bus, it will automatically be detected by the other units on the CAN bus line. The CAN bus line is continuously monitored, and in case a CAN ID is lost (wire break, short circuit or defective unit) a "CAN ID missing" alarm will be raised. The text shown on the display will indicate which CAN ID is missing, for example "CAN ID2 missing". A "Duplicate CAN ID" alarm can also be raised if the system detects two units with the same ID. In case of a CAN failure on the CAN bus controlling the load sharing, the system can be set up to react in different ways. The "CAN ID missing" alarm is configurable and can be set up in menu 7860. The "Duplicate CAN ID" is not configurable, but shares the failure mode with the "CAN ID missing" alarm. If one or both of the two alarms is activated, the unit is forced into the mode selected in menu 7865.

SWBD control

In SWBD control mode the unit's regulator is off, and the user is not able to control the unit with the display.

Manual (default)

In manual control mode the unit's regulator is off, but the user can still control the unit manually through the display or digital inputs.

No mode change

When a CAN ID missing error is detected an alarm is given, but there will be no change to the system.

Force analogue LS

In case of an alarm the system will change from CANshare to analogue load sharing. This can be used to make an automatic failover solution. However, there is no automatic check of the availability of the analogue load sharing line, and it will change to analogue load sharing even if the load sharing line is not present.

CAN bus alarms

The following alarms can be displayed on a unit in case of CAN bus communication failures:

- 7860 CAN ID X MISSING
 - The unit has lost CAN bus communication to one or more CAN IDs.
- Duplicate CAN ID
 - The unit has detected another unit in the load sharing system with a similar ID.



INFO

The "CAN ID missing" alarms are automatically acknowledged. The auto acknowledge function can be disabled with the PC utility software.

4.2.5 CAN ID overview menu (PPU-3 only)

By entering the JUMP menu 9250 on PPU-3, it is possible to see which CAN IDs that are active on the CANshare line. This is a useful tool to make sure that all controllers are active on the CANshare line, and also - in case of a CAN fail - to locate where the CAN error is placed.

4.2.6 Removing a unit from the load sharing setup

If a unit is removed from the system, it will create an alarm due to the supervision of the CAN bus. If you wish to permanently remove a unit from the system, it is possible to reset the system and avoid the CAN ID MISSING alarm. After the unit has been removed, use the display on one of the remaining units and go to setting 7850 and select SETUP. To reset the system, press enter, type in password, press UP to change from NO to YES and select SAVE. The system is now being reset, the unit is removed from the load sharing system, and the reset function will automatically change back to NO.



INFO

The default password level for setting 7853 "CANshare setup" is Master.

4.3 CANshare without supervision

4.3.1 Description of function

CANshare without supervision is a similar mode for load sharing between two or more gensets. With CANshare without supervision there are no alarms if a unit loses connection to the CAN bus line. When using CANshare without supervision, the units are not given a unique ID or section ID. When connecting to the CAN bus line, the CANshare system automatically assigns the unit an available ID. This is handled by the internal CAN bus communication, and the user will not be able to choose an ID for the unit. When disconnecting a unit from the CAN bus line, the CANshare without supervision automatically detects this and removes the specific ID from the load sharing system.

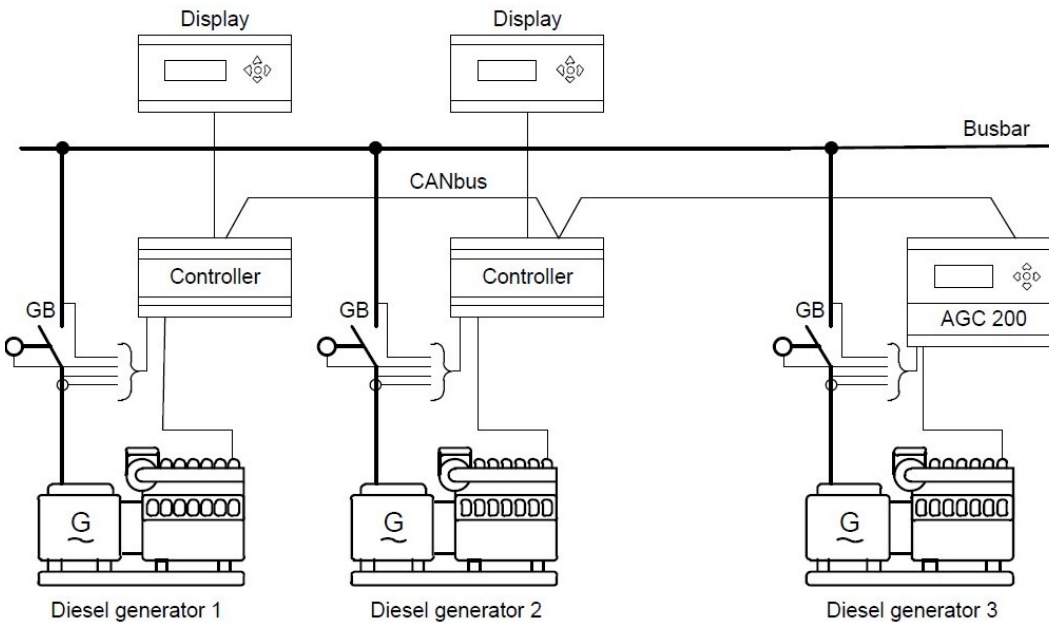


Figure 5 shows a CANshare setup.

4.4 Load sharing supervision

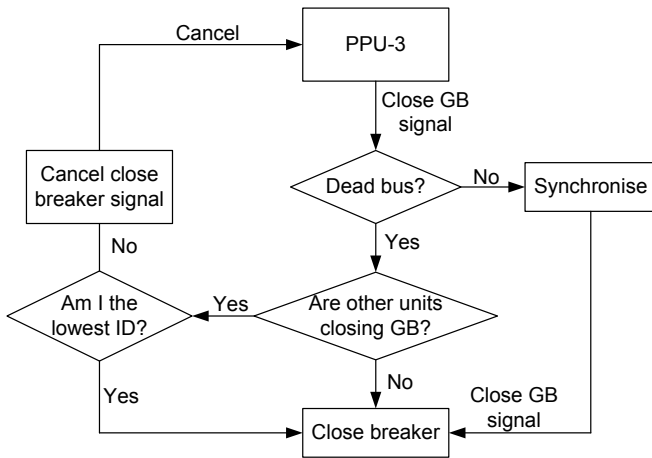
4.4.1 Description of function

When using CANshare, both with and without supervision, there will always be a continuous active load sharing supervision on both active and reactive power (regardless of option D1). The supervision alarm on the active power can be set up in parameter 2960 "P Loadsh. Fail", and for the reactive power in parameter 2970 "Q Loadsh. Fail".

4.5 Dead bus closing

4.5.1 Description of function

Option G9 also enables dead bus closing for units in the same load sharing section. Through CAN bus communication, the unit makes sure that no other unit is connecting to the busbar at the same time. This reduces unintended start-ups after blackout.



4.6 CAN flags

4.6.1 Available CAN flags

16 CAN flags are available in M-Logic for exchanging status and commands between the units connected to the CANshare line.

Activation of a CAN flag is done by activating a CAN bus command in the M-Logic output. CAN flags can be used as input events.

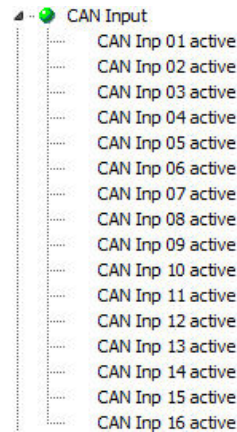
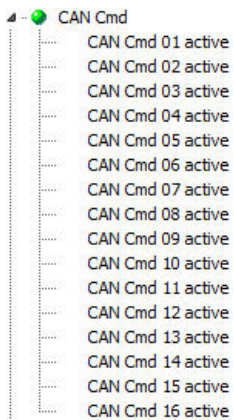
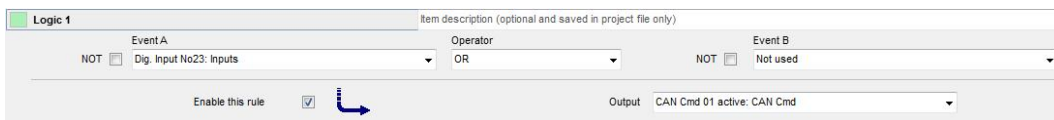


Figure 6: Output commands for CAN flags.

Figure 7: Input events for CAN flags.



In the above example, "CAN cmd 01" will be active when digital input 23 is ON. All units on the CANshare line will receive "CAN input 01 active" and then be able to act on this information.



INFO

Only constant signals, for example from digital inputs or AOP buttons, can be used to activate the CAN flags. Since an AOP button sends a pulse signal, a latch function must be made to make use of this.

4.7 CANshare setup

4.7.1 Display setup

Using the display, it is possible to set up the CANshare system for the unit. With the display you can set the unique ID of the unit, the section ID and the alarm handling.

Set points available in menu 7850:

- ID: CAN LS ID. Here you can set the unit ID. The ID range is from 1 to 32.
- SEC: CAN LS section. Here you can set the section ID or choose M-Logic. The section ID range is from 1 to 5.
- SETUP: Resets the system. For more information, see chapter "Removing a unit from the load sharing setup".
- SUP: CAN LS supervision. Here you can enable and disable the CAN bus supervision.



INFO

The default password level for 7853 "CANshare setup" is Master.

Set points available in menu 7860:

- DEL: Defines how long the system has to recover before an alarm is activated.
- OA: Output A. Optional selection of an output when the alarm is active.
- OB: Output B. Optional selection of an output when the alarm is active.
- FC: Fail class. Defines how the system reacts to a CAN ID missing alarm.
- MODE: Mode change selection. If an alarm is active, the system can change the mode of operation.

All modes are described in the chapter "CAN failure mode". For general information about outputs and fail classes, see the "Designer's Reference Handbook" for the unit.

5. Parameter list

5.1 Further information

5.1.1 Setting location

The option G9 relates to the parameters 7850 and 7860.

For further information, see the separate parameter list for the Multi-line unit in question:

PPU-3	Document number 4189340581
GPC-3	Document number 4189340580