

IGS-NT Redundant controllers

Application sheet



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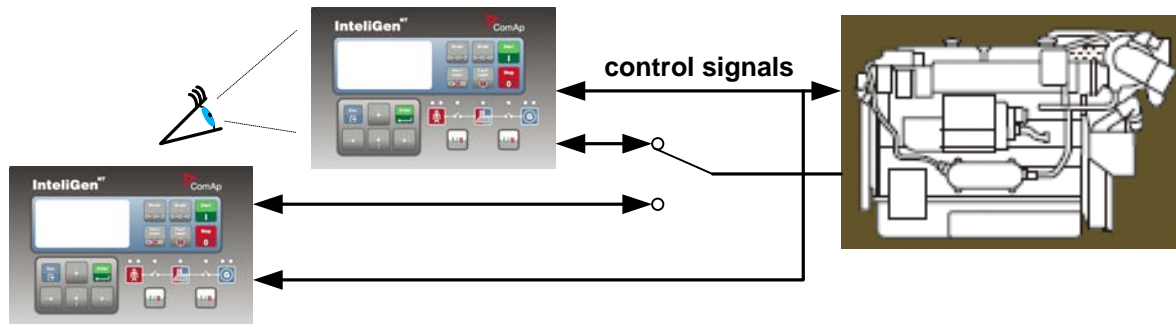
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1. General description

The redundant controllers are dedicated to application, where a fail of the IGS-NT controller would cause a serious menace for the controlled process.

The main idea of this application is a “master” controller, which controls the genset, is watched by a backup controller. In case of some failure of the master, the backup controller assumes the control process.



In this application guide there are mentioned only the outputs, inputs and setpoints which are necessary to run the redundant controllers. For the detail description of possible inputs, outputs and setpoints adjustment see the application guide or the manual for each application.

The redundant controllers are recommended to run with the firmware version IGS-NT 2.4., or higher.

The IGS-NT controllers enable monitoring their state using the CAN2 line. The backup controller evaluates messages which are periodically sent by master controller. In case these messages are not received, backup controller sets the binary output: CtrlHBeat FD (Controller Heart Beat Failure Detect). Time between the master defect and activation of corresponding BO of the backup controller is 200ms at maximum.

Distinction between the master and backup controller is in setpoint: **Process Control: WatchedContr** (Address of watched controller) adjustment. Master controller has this setpoint set to value 0 = NONE. The backup controller has to have this setpoint adjusted to the address of the master controller, which is supposed to be watched (1-17).

In standard conditions – the master controller is in operation, the backup controller is just monitoring – the backup controller is in Emergency manual mode. This mode is activated by closed BI: **Emerg.manual**. In this mode the controller is just monitoring the state of the process, accepting commands for e.g. close/open GCB, without any alarm indication. In this mode the controller's Binary Outputs are internally disconnected.

This state lasts as long as the backup controller senses the master controller messages on the CAN2 bus.

When the backup controller detect no messages from the master controller, the BO: **CtrlHBeat FD** is activated. This BO is supposed to take control of the external logic (relays, PLC...). This logic should deactivate the signal for the **Emerg.manual** input of the backup controller, and activate the **Emerg.manual** input for the master controller.

By this action the roles of the controllers are interchanged. The master controller is switched to the Emergency manual mode, just monitoring the situation; the backup controller assumes the control of the genset. This state is supposed to last till the manual intervention of the service.

2. Recommended wiring

In this chapter there will be described one of the possible wirings between the master and the back-up controller, with consequential circuits (relays used as external logic). These consequential circuits ensure behavior - once the CtrlHBeat FD is activated the backup controller assumes the control process, till the service intervention.

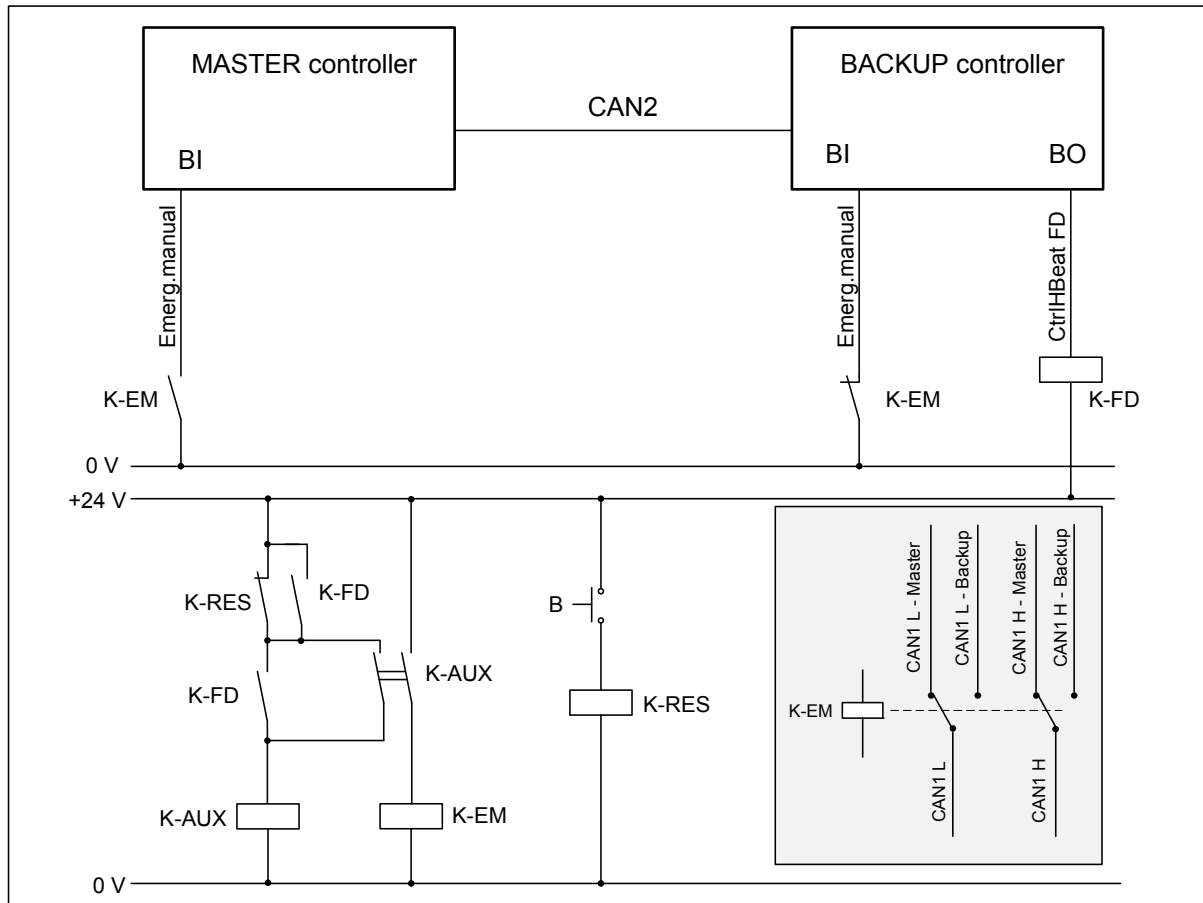


Fig.1. Possible connection of the BO:CtrlHBeat FD and signal for Emerg.manual reconnection

When the BACKUP controller detects no messages from the MASTER controller, the BO:CtrlHBeatFD is activated, which consequently activates the K-FD relay (FD – Failure Detect). This activates the auxiliary relay K-AUX and consequently the K-EM relay (EM – Emergency Manual). The normally open contact of K-EM relay is closed; the normally closed contacts of the K-EM relay are opened. This caused, the Emerg.manual state is activated on the MASTER controller and deactivated on the BACKUP controller.

This state remains till manual intervention of the operator – till the button B is pressed and the Master controller is “healthy” state.

The relay K-EM should be used as a source for switching the I/O signals between the master and backup controller.

3. Recommendation

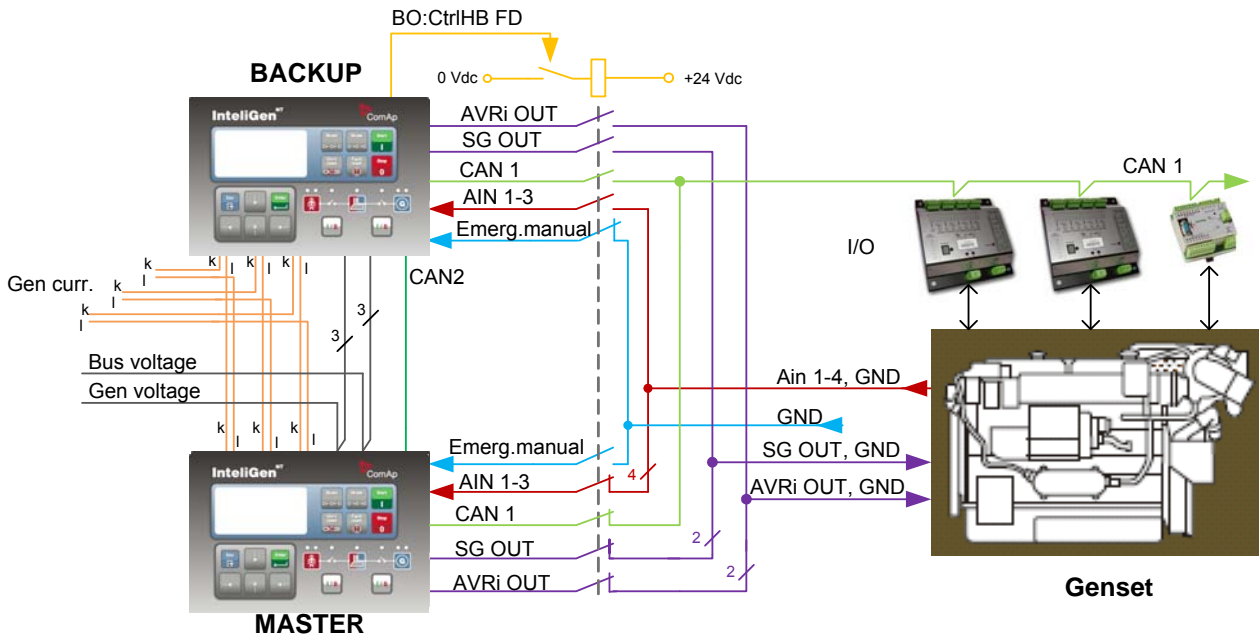
Following I/O should be connected directly to both controllers;

- Binary Inputs
- Binary Outputs
- Current measurement inputs
- Voltage measurement inputs
- RPM input – be careful about the RPM ground signal

Following I/O should be switched to the active controller:

- Speed Governor Output
- AVRi output
- Analog inputs
- Analog outputs
- Expansion I/O modules (including ECU)

Because of the analogue input signals will be switched between both controllers, the appropriate delay on their protection evaluation should be configured



When the controller is switched to Emergency manual state, all the Binary Outputs are opened except for:

- Stop Solenoid
- The output terminals which are configured with inversion are closed

Due to this fact the genset must to be controlled by signal Stop Solenoid instead of Fuel Solenoid. Pulse outputs GCB ON coil, GCB OFF coil or GCB UV coil must be used instead of the level signal GCB close/open.

When the controller is switched from Emerg.manual state, the controller recovers to the previous mode and behaves based on the measured values from the genset. Should the engine run it will keep the engine running.

The ECU and external modules (AIN8, BIN16/8...) should be configured with the protection type: "No Protection" due to the fact these modules will be "switched" between both controllers, in dependence on which controller is active at the moment.

The Redundant controller solution was tested on engines, where the speed is not controlled via J1939 line.

Due to the fact the CAN1 line is switched over between the master and backup controller, the signals sent to ECU will be switched also. The reaction on short time (200ms) speed signal interruption of the particular ECU must be found out at first.