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Guideline**

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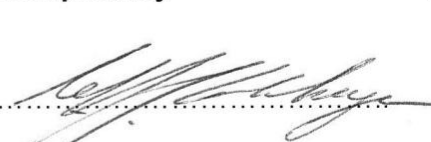
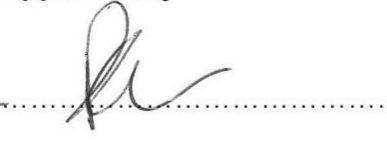
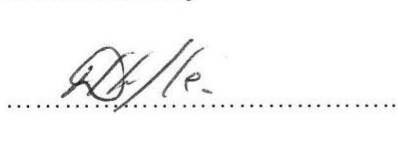
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1. INTRODUCTION

This document was created as a guideline for plant control modes.

2. SUPPORTING CLAUSES

2.1 SCOPE

2.1.1 Purpose

The purpose of this document is to serve as a guideline for plant control modes.

2.1.2 Applicability

This document shall apply throughout Eskom Holdings Limited Divisions.

2.2 NORMATIVE/INFORMATIVE REFERENCES

2.2.1 Normative

None

2.2.2 Informative

None

2.3 DEFINITIONS

None

2.3.1 Disclosure Classification

Controlled Disclosure: Controlled Disclosure to External Parties (either enforced by law, or discretionary).

2.4 ABBREVIATIONS

Abbreviation	Description
C&I	Control & Instrumentation
HMI	Human Machine Interface
IO	Input / Output
LCS	Local Control Station
VDU	Visual Display Unit

2.5 ROLES AND RESPONSIBILITIES

None

2.6 PROCESS FOR MONITORING

None

2.7 RELATED/SUPPORTING DOCUMENTS

None

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3. PLANT CONTROL MODES GUIDELINE

3.1 DEFINITIONS OF OPERATING MODES

Where local control facilities are require three distinct modes of operation are provided: Automatic, Remote Manual and Local Manual. Selections of modes of control will be available at group, sub group and device level as indicated below.

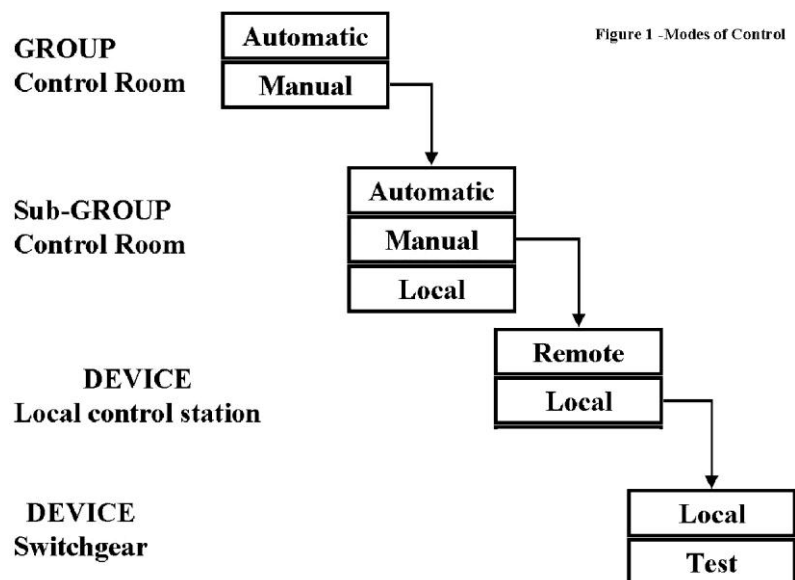


Figure 1: Modes of control

The hierarchy is divided into three distinct levels namely group, sub group and device level. Device level is the lowest level where control of individual devices takes place in a local manual mode from local control stations/ switchgear in the field. Group and sub group levels are similar in that they have devices or groups of devices reporting to them. Under group or sub group control, the control of devices will be by the control system with minor operator involvement.

3.2 OPERATING PHILOSOPHY

The operating philosophy is based on a level of automation where the plant is in auto mode for all normal operations. In the case where manual control of a device is required, the control room operator will be required to de-select the device from "Automatic" mode to "Manual" for remote manual operation on the control room VDU.

For manual control of device in the field at a Local Control Station the control room operator requires to select "Local" mode (de-select "Manual" to "Local") at the control room VDU allowing the Local Control Station Function to be active for the Local Plant Operator.

The control room VDU system is seen as the master for selection of operating modes for devices. If local or manual operation is desired, the device is first selected for local control from the control room VDU before selection to local on the LCS in the field. If a Local/Remote switch is accidentally switched in the field, the automatic operation is not interrupted, but an alarm is raised on the control room VDU.

In the abnormal situation of a complete operator station failure (preventing the selection of local control in the control room), the operator in the control room must be provided with the facility to activate local control for all devices in the plant areas associated with the failed operator station.

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3.3 AUTO CONTROL MODE

Continuous or sequential control of the plant, after initiation by the control room operator, is performed by the control system without operator intervention. This mode selection will be applicable at group and sub group level and is considered as the normal operation of the plant.

3.3.1 Sub Group Control Mode

In this control mode, the control shifts one level down from the group level control. The control room operator uses this in cases where the group consists of one or more sub groups and requires control of each sub group.

3.3.2 Group Control Mode

In this control mode, the control can be shifted one level up from the sub group level control. This mode selection is applicable at sub group level where the sub group is subordinate to a group and release to group level is required.

3.3.3 Remote Manual Control Mode

In Remote Manual mode, the control room operator at the control room VDU's initiates control of the individual devices. Selection of this mode is required from the Control Room VDU. When the sub-group is in manual mode, all the safety and process interlocks remain active. This mode will be selectable from either group or sub group level where devices are reporting to the group or sub group.

3.3.4 Local Manual Control Mode

In local manual mode, the control of devices is initiated from the Local Control Station on the plant. To achieve this function the control room operator selects the "Local" mode at the control room VDU, which provides a release signal to the Local Control Station for the control functions to be active so that the Local Plant Operator is allowed to initiate the individual control devices in the field. In this mode all the safety and process interlocks remain active. This mode will be selectable from sub group level where devices are reporting to the group or sub group.

3.3.5 Local Maintenance Control Mode

In local maintenance mode, the control of devices is initiated from the field mounted Local Control station. To achieve this function the control room operator selects the "Maintenance" mode at the control room VDU, which provides a release signal to the Local Control Station. The control function are then activated so that the Local Plant Operator is allowed to initiate control of the individual control devices in the field. In this mode all the safety interlocks (example conveyor long-line protections) are active however the process interlocks are inactive. This mode will be selectable from sub group level where devices are reporting to the group or sub group.

3.3.6 Local Control Station Equipment

Each LCS will be equipped with the following minimum functions, and these functions form an integrated part of the Control System:

- Local/Remote selector switch
- Emergency stop pushbutton
- Lamp test pushbutton

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- Local indication lamp
- Open/Close (Stop/Start) pushbuttons
- Open/close (Stopped/Running) indicating lamps
- Fault acknowledge pushbutton
- Fault indication lamp

Extra functions will be required on certain panels for the Slurry plant. Operators, for instance, need to confirm hydrobin statuses by visually inspecting bin levels. These extra functions are indicated on the IO Block diagrams.

3.3.7 Prerequisites for Local Manual Operation at Device Level

Under sub group automatic, the device mode selection will be locked in remote mode and selection to local manual will only be possible under the following conditions:

- The sub group should be selected to local manual mode.
- If the sub group is not selected to local manual mode, selection will be possible if the device is not in use or not required by the group sequence operation.

See Figure 2 for a flow diagram of the procedure to select a device to local manual

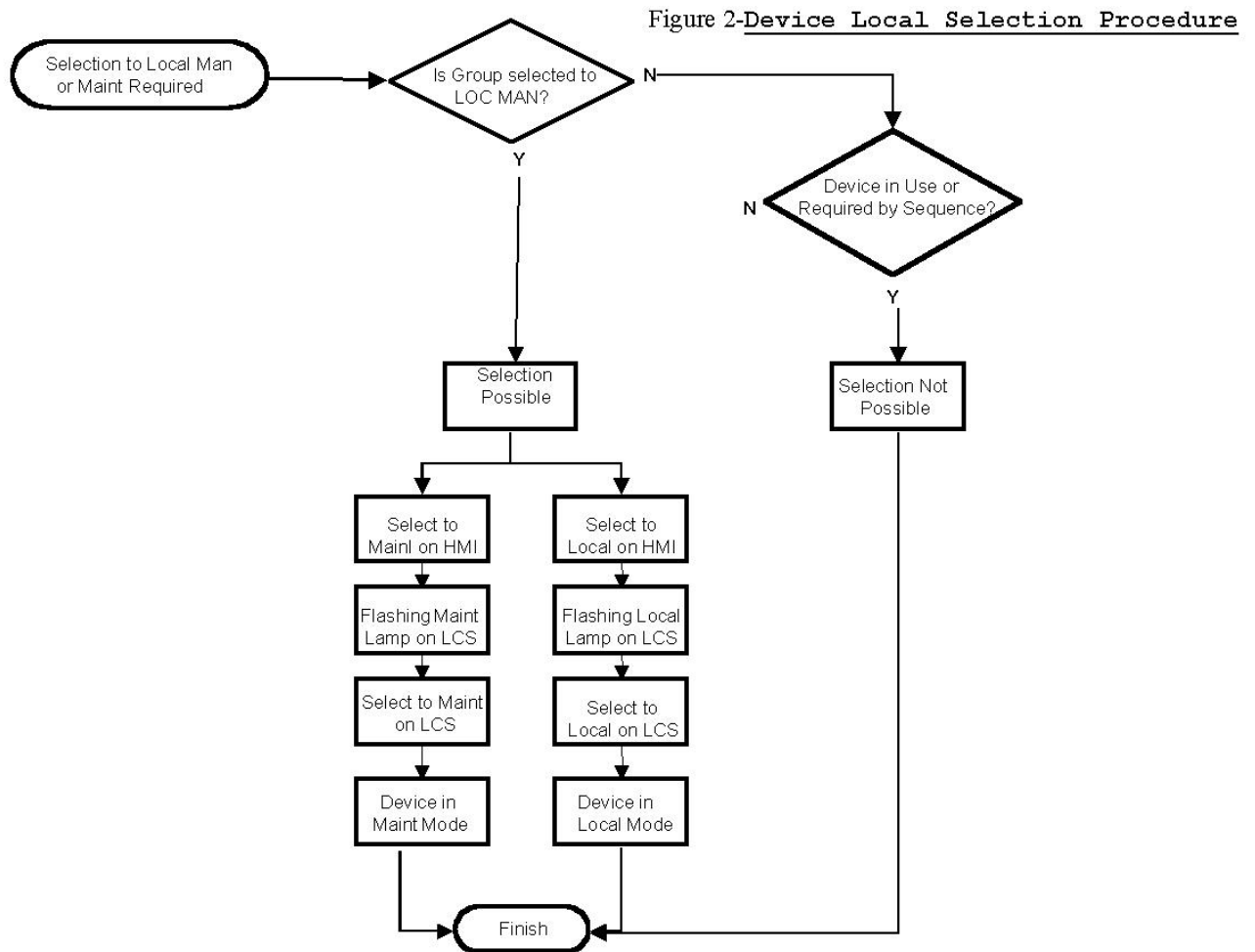


Figure 2: Device Local Selection Procedure

3.4 MODE SELECTIONS AT SUB GROUP LEVEL

3.4.1 Group Operation

This selection releases a sub group for operation at group level in cases where the sub group is to be placed under group level control. This mode will be similar to auto mode with the exception that the operator will not have control of the sub group.

3.4.2 Auto Operation

In auto operation, the operator will have the facility to start a sequence in automatic mode for a sub group that has been released from group control. In some cases some operations at sub group will be inhibited if some of the other groups are still under group control

3.4.3 Remote Manual Operation

In this mode, the control is transferred to the manual control in the Control Room and the Control Room Operator will have control over the devices.

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3.4.4 Local Manual Operation

In this mode, the control is transferred to the Local Control Station and the Control Room Operator will have no control over the devices from the HMI.

3.4.5 Prerequisites for Sub Group Automatic Operation

Before selecting automatic mode at the sub group level, it is necessary that all the devices constituting the sub group are selected to remote operation at the Local Control Station selector switch. In some cases (e.g. standby pumps) it will not be necessary that the device is selected to remote, provided it is not required by the group sequence operation. The logic for determining whether a device is not required will be developed in the group or sequence logics.

When a sub group is selected to automatic operation, all the devices on the Local Control Station are switched to Remote will become part automatic sequence control.

See

Figure 3 for a flow diagram of the procedure to select a sub group to auto.

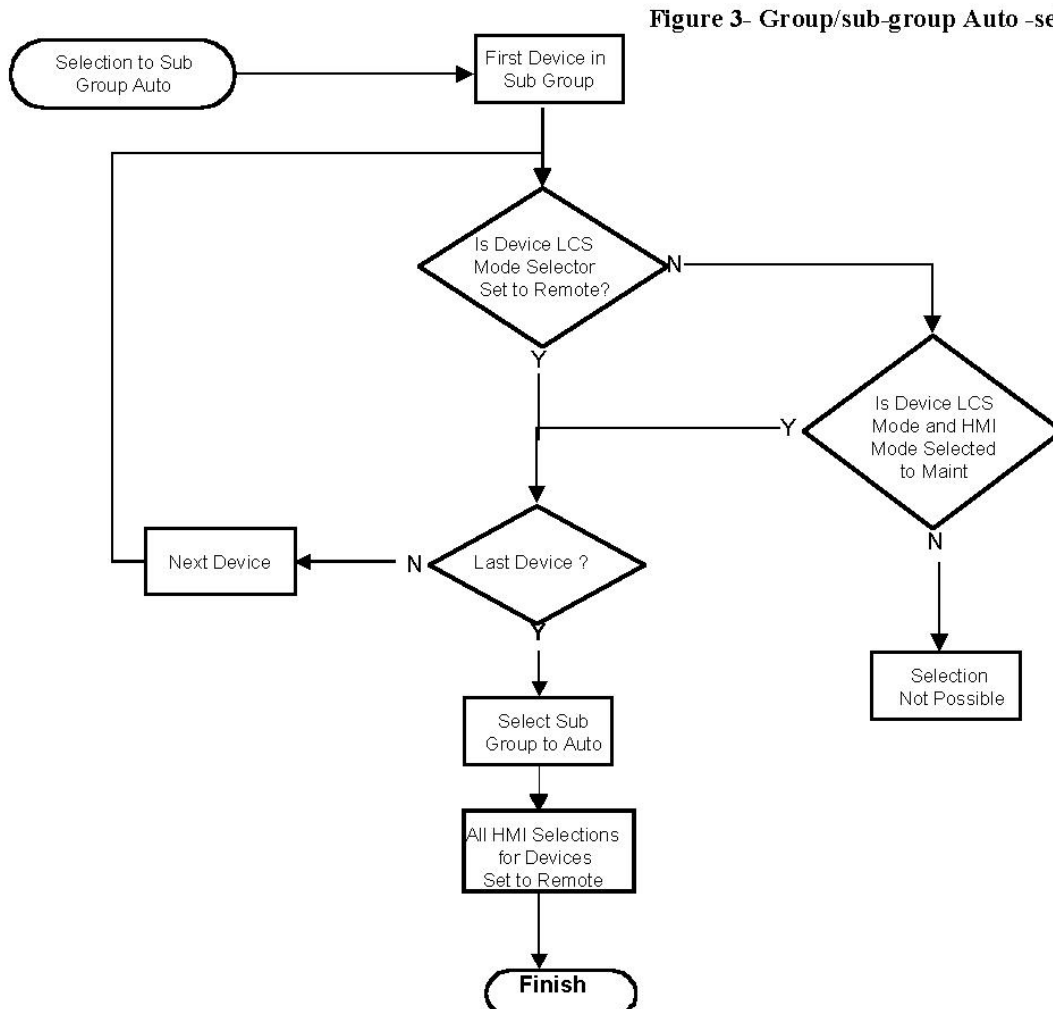


Figure 3: Group/sub-group Auto-selection procedure

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3.5 MODE SELECTIONS AT GROUP LEVEL

3.5.1.1 Auto Operation

In auto operation, the operator will have the facility to start a sequence in automatic mode.

3.5.1.2 Sub Group Operation

In this mode, the control will be transferred to the sub group level for all sub groups reporting to the group.

3.5.1.3 Prerequisites for Group Auto Operation

In order for a group to be selected to auto operation, at least one sub group is required to be selected to group control.

In the cases where the group has devices associated, the same prerequisites as for the sub group will apply.

4. AUTHORISATION

This document has been seen and accepted by:

Name & Surname	Designation
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5. REVISIONS

Date	Rev.	Compiler	Remarks
November 2012	0	C. Kohlmeyer	Draft document for Review created from EED_GTD_C&I 007
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6. DEVELOPMENT TEAM

The following people were involved in the development of this document:

- None

7. ACKNOWLEDGEMENTS

- None

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