FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

ANNEXURE-5 OF PY-55127 REV-00

DWG. NO. 4-381-21-03556

SHT. 01 OF 11

THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED. IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN any WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY

COMPUTER FILE NAME IE057-LOGICS-R01.DWG

REF. DRG. NO.

SIGN. AND DATE

INVENTORY NO

DRIVE CONTROL PHILOSOPHY

SUBMITTED FOR:	APPROVAL	INFORMATION ✓	REFERENCE	RECORD	CONSTRUCTION

CLIENT

NMDC LIMITED
3.0 MTPY INTEGRATED STEEL PLANT
(NISP), NAGARNAR, CHHATTISGARH
TURBO BLOWER STATION (PACKAGE NO. 010A)

CONSULTANT

मेकॉन लिमिटेड
MECON LIMITED

CONTRACTOR

BHARAT HEAVY ELECTRICALS LTD.
HYDERABAD

DESIGNED	ROBINS	DRIVE CONTROL PHILOSOPHY	
DRAWN	ROBINS		
CHECKED	KAMAL		
APPROVED	SEKHAR	SCALE N.A.	SHEET 1 OF 11 REV. 02
	DATE:25.09.14	VENDOR'S DRAWING NO.	4-381-21-03556
		PROJECT Drg. No.-	NMDC/BHEL/010A/00/27/DE/1601

REV.	DATE	ALTERED	ZONE
		CHD/APPD	

REV.	DATE	ALTERED	ZONE
02	20.12.14	ROBINS CHD/APPD KAMAL	REVISED IN LINE WITH OTHER UNIT FEEDBACK

REV.	DATE	ALTERED	ZONE
01	6.11.14	ROBINS CHD/APPD KAMAL	REVISED IN LINE WITH MOM DATED 6.11.2014

CONTROL PHILOSOPHY

The control philosophy for different type of drives such as Bi-directional, unidirectional, Solenoid operated are detailed below:

1.0 Bi-directional drives (inching or otherwise)(Non- Intelligent Modules)

a) All bi-directional drives shall be operable from Remote i.e. from Control Room. Local control stations (LCS) shall be provided for all bi-directional drives, LCS shall have Open, Close, Emergency Stop push buttons. Interposing relay in DCS.

b) Remote manual operation of all drives shall be done from Operator station. Suitable provision shall be made for Bidirectional drives requiring remote sequential / automatic operation.

c) Remote control commands i.e. OPEN, CLOSE and STOP (separate and independent), generated from LCS shall be issued to MCC. The open & close commands shall be reset from Limit switch (LS) feedback. The LS feedback is taken from actuator to MCC. The LS feedback is taken to DCS through MCC with multiplication relay in MCC (latching in MCC). Remote selection feedback shall be envisaged from MCC to DCS.

d) Open and Close push button from LCS shall be wired to MCC.
(Open – 'NO' contact; Close – 'NO' Contact).

e) Emergency stop of the drive has been envisaged from LCS. Emergency stop push button shall be mushroom head type and shall be push to stop and turn to release type. The Emergency stop pushbutton ('NC' contact) shall be hard-wired directly to MCC.

f) Load break switch (LBS) shall be provided near all valve actuators for power isolation. Open power contact of LBS shall be wired to MCC.

g) Necessary electrical protections shall be realized at MCC, whereas process interlocks and protections shall be realized in DCS.

h) Following signal exchange shall take place between MCC & DCS.

COPYRIGHT AND CONFIDENTIAL
The information on this document is the property of BHEL. It must not be used directly or indirectly in any way detrimental to the interest of the company.

- Valve open, close & Motor stop command from DCS.
- "MCC Disturbance" (Thermal overload /local/ MCC not in service/ switch fuse off).
- Remote selection from MCC to DCS (DI)
- RUN/ON feedback

I) Following signal exchange shall take place from valve actuator to DCS.
- Valve status feed back by means of end position limit switch contact (open & close).
- Torque switch contacts (open & close).
- Valve position feed back (4-20 mA) for inching duty drives.

J) Following signal exchange shall take place from valve actuator to MCC.
- Valve status feed back by means of end position limit switch contact (open & close).
- Torque switch contacts (open & close).

K) Following signal exchange shall take place from Local control station to MCC. These provisional shall be part of actuator. No separate LCS is applicable.
- Open push button.
- Close push button.
- Emergency stop push button.
- L/R selection switch

L) Following signal exchange shall take place from Local control station to DCS.
- Emergency stop push button feedback.

2.0 Unidirectional LT Drives(Intelligent Modules)

a) Unidirectional LT drives shall be operable from Remote i.e. from CONTROL ROOM. Local control stations (LCS) shall be provided for all LT drives, LCS shall have Start and Emergency Stop push buttons.

b) Remote operation of all drives shall be done from Operator station. Suitable provision shall be made for those unidirectional drives requiring remote sequential / automatic operation. Remote selection

COPYRIGHT AND CONFIDENTIAL
The information on this document is the property of BHEL. It must not be used directly or indirectly in any way detrimental to the interest of the company.

feedback) (DI) shall be envisaged from IMCC to DCS. L/R switch in LCS

c) Remote control commands i.e. start and stop (separate and independent), shall be generated from DCS and shall be issued to IMCC through interposing relays located in DCS. Latching command shall be done in IMCC.

d) Start push button from LCS shall be wired to IMCC. (Start-'NO'). L/R switch hard wired to IMCC.

e) Emergency stop of the drive has been envisaged from LCS. Emergency stop push button shall be mushroom head type and shall be push to stop and turn to release type. The Emergency stop pushbutton ('NC' contact) shall be hard-wired directly to IMCC.

f) Necessary electrical protections for the drive shall be realized at IMCC, whereas process interlocks and protections are realized in DCS.

g) Following signal exchange shall take place between IMCC & DCS:
- Drive start command & stop command.
- "IMCC Disturbance" (Thermal overload/ local/ IMCC not in service/ switch fuse off).
- Remote selection feedback from IMCC to DCS (DI).
- RUN/ON feedback
- Tripped feedback

h) Following signal exchange shall take place between IMCC & DCS for both soft & hardwire:
- Remote selection feedback from IMCC to DCS (DI).
- RUN/ON feedback
- Tripped feedback
- Current feedback(Motor rating above 45 KW)

i) Suitable current transformer & transducer shall be provided in IMCC wherever drive rating is above 45 KW. Remote monitoring shall be in DCS.

j) Following signal exchange shall take place from Local control station to IMCC.

COPYRIGHT AND CONFIDENTIAL
The information on this document is the property of BHEL. It must not be used directly or indirectly in any way detrimental to the interest of the company.

- Start push button.
- Emergency stop push button.(Emergency stop PB disable after commissioning)
- Ammeter (only for motor > 45 KW)
- L/R Switch

k) Following signal exchange shall take place from Local control station to DCS.

- Emergency stop push button feedback.

3.0 Solenoid Operated Drives

a) Solenoid operated drives shall be operated from remote from CONTROL ROOM. Local operation of these drives is not envisaged.

b) Remote manual operation of all drives shall be done from Operator station. Suitable provision shall be made for Drives requiring remote sequential / automatic operation.

c) Remote control commands i.e. Energize / De- energise shall be generated from DCS and shall be issued to the solenoid through interposing relays located in DCS for the 24V DC operated solenoid drives. Powering of solenoid shall be from DCS

d) Necessary process interlocks shall be realized in DCS.

e) The following signal exchange shall take place between solenoid operated drive and DCS for solenoids operating on 24V DC.

- Valve open command and close command from DCS through interposing relay mounted in DCS.
- Status feedback from the drive by means of limit switches.

4.0 D.C. DRIVES/ MOTORS

a) D.C. drives shall be operated from Remote i.e. from CONTROL ROOM.

b) Remote manual operation of all drives shall be done from operator station. Suitable provision shall be made for unidirectional drives requiring remote sequential / automatic operation.

c) Remote momentary control commands i.e. start and stop (separate and independent) shall be generated from DCS and shall be issued to DCSC through interposing relays located in DCS.

d) Necessary electrical protection for drive shall be realized at DCSC, whereas process interlocks and protections are realized in DCS.

COPYRIGHT AND CONFIDENTIAL
The information on this document is the property of BHEL. It must not be used directly or indirectly in any way detrimental to the interest of the company.

e) Following signal exchange shall take place between DCSC and DCS: -
   a. Drive start command & stop commands
   b. Drive status feed backs (ON/OFF), under voltage feed back & over load feed back .
   c. Motor current
   d. DC power fail (optional)

f) Suitable DC shunt & transducer shall be provided in DCSC for remote monitoring of motor current in DCS.

g) Following signal exchange shall take place from Local control station to DCSC.
   - Start push button.
   - Emergency stop push button.

5.0 ANALOG DRIVES

a) A drive control function residing in DPUs is used to position the pneumatically operated control valves. Interlock and protection Open/Close Commands, originating from field or generated internally in Control Logics , are interfaced with the drive control function residing in processors.

b) Control Valve actuator design shall take care of fail safe condition i.e. bringing valve to full open/full close or stay put mode, on signal failure.

c) Auto/Manual operator control and display for various control loops shall be provided through Operator station, using Analog Displays.

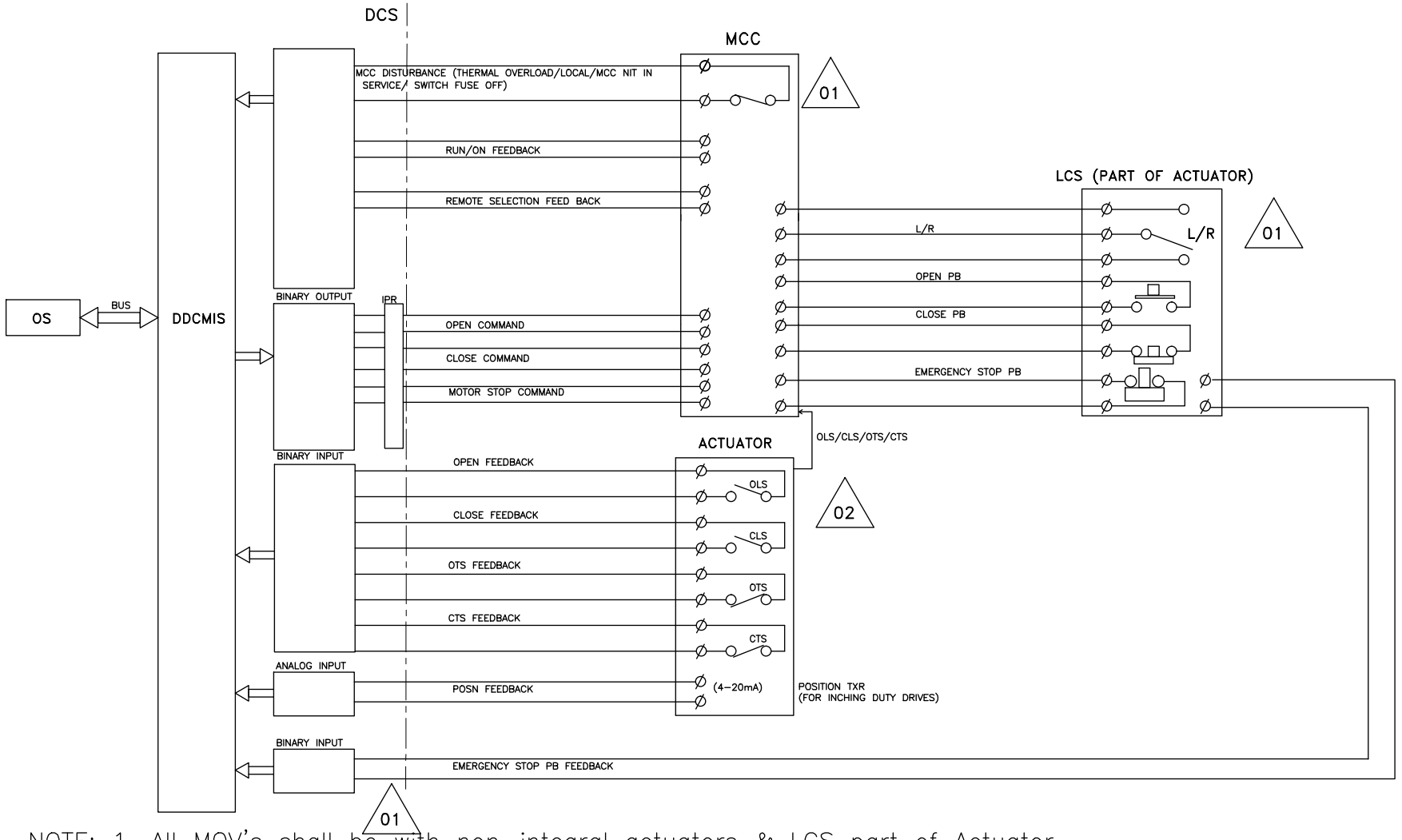
d) Analog Displays have following functionality:
   – Auto/Manual selection with control device “Raise/Lower Buttons”
   – Set point indication with “Raise/Lower Buttons”
   – Indication for deviation between set point and measured value
   – Measured value indication.
   – Final control element portion indicators.

COPYRIGHT AND CONFIDENTIAL
The information on this document is the property of BHEL. It must not be used directly or indirectly in any way detrimental to the interest of the company.

FIRST ANGLE PROJECTION | (ALL DIMENSIONS ARE IN mm)

DRG. NO. 4-381-21-03556 | SHT. 6 OF 11

DCS INTERFACE FOR BIDIRECTIONAL DRIVE



NOTE: 1. All MOV's shall be with non-integral actuators & LCS part of Actuator.

THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED.
IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTREST OF THE COMPANY

INVENTORY NO | SIGN. AND DATE | REF. DRG. NO. E057-LOGICS-R01.DWG

TITLE	CARD CODE	DRAWING NO.	REV.
DRIVE CONTROL PHILOSOPHY		4-381-21-03556	02
		SHEET NO. 7 / NO OF SHEETS 11	

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

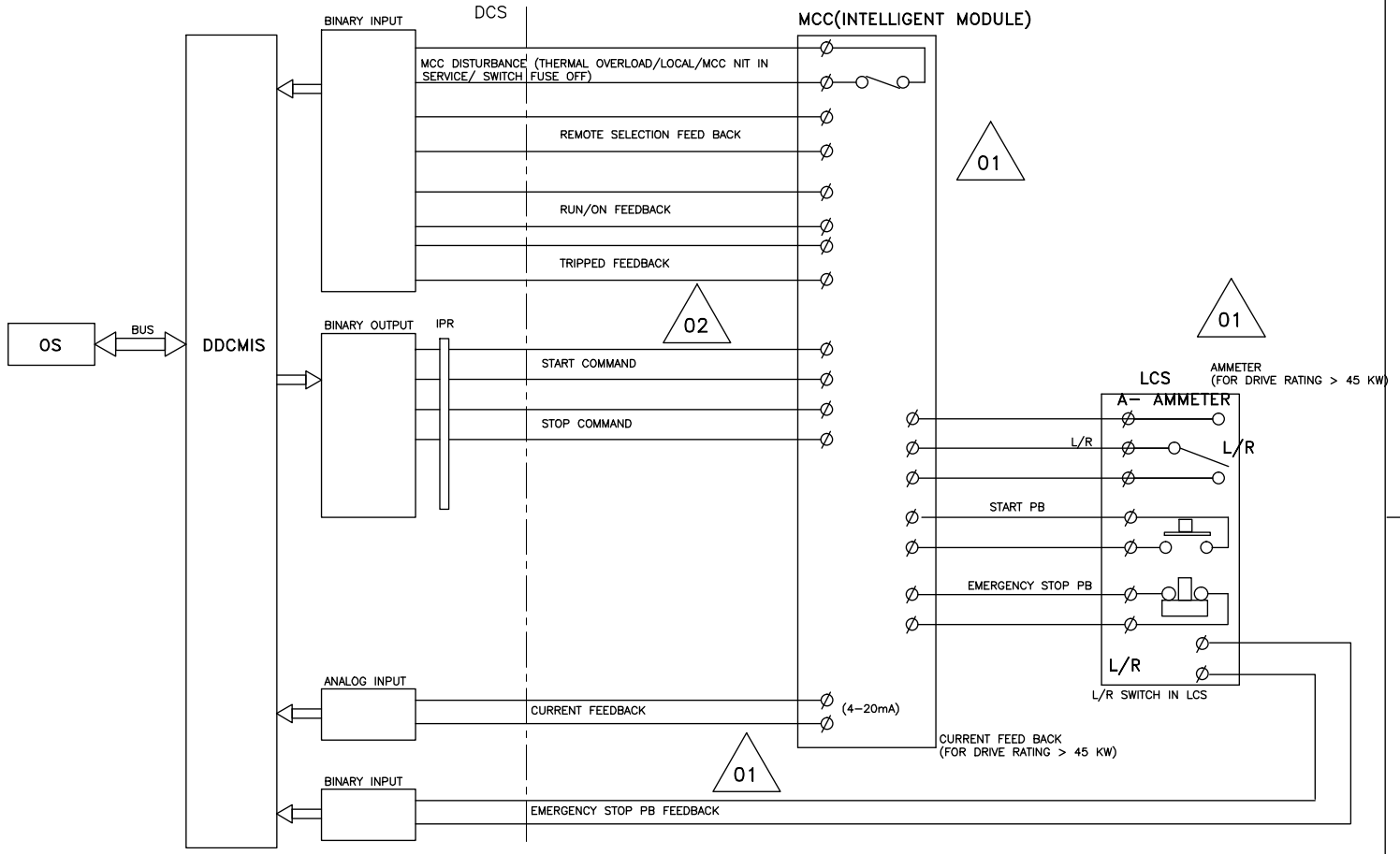
DRG. NO. 4-381-21-03556

SHT. 7 OF 11

THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED.
IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTREST OF THE COMPANY

INVENTORY NO | SIGN. AND DATE | REF. DRG. NO. E057-LOGICS-R01.DWG

DCS INTERFACE FOR UNIDIRECTIONAL LT DRIVE



NOTE:

1. All LT drives shall be with MCC intelligent Module TYPE.
2. Following signal shall be both soft & hardwire: a)Remote selection feedback. b)RUN/ON feedback. c)Tripped feedback d) Current feedback.

02

TITLE	CARD CODE	DRAWING NO.	REV.
DRIVE CONTROL PHILOSOPHY		4-381-21-03556	02
		SHEET NO. 8 / NO OF SHEETS 11	

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

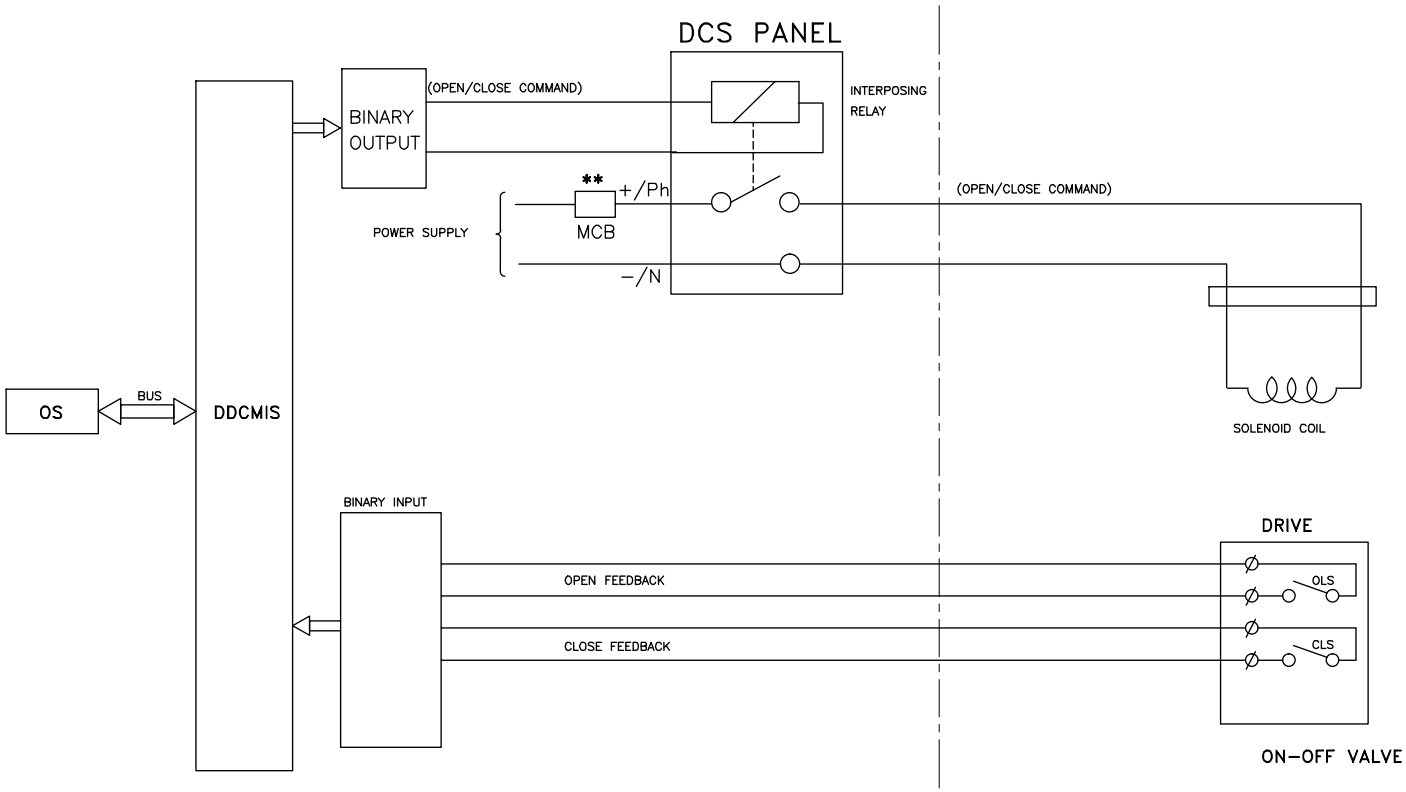
DRG. NO. 4-381-21-03556

SHT. 8 OF 11

THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED.
IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTREST OF THE COMPANY

INVENTORY NO | SIGN. AND DATE | REF. DRG. NO. IE057-LOGICS-R01.DWG

DCS INTERFACE FOR 24 VDC SOLENOID DRIVE(ON-OFF APPLICATION)



NOTE:

1. Normal Energised/De-energisation of solenoid shall be selected based on failsafe condition/operations.
2. **-MCB SHALL BE PROVIDED FOR EACH SOLENOID.

TITLE	CARD CODE	DRAWING NO.	REV.
DRIVE CONTROL PHILOSOPHY		4-381-21-03556	02
		SHEET NO. 9 / NO OF SHEETS 11	

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

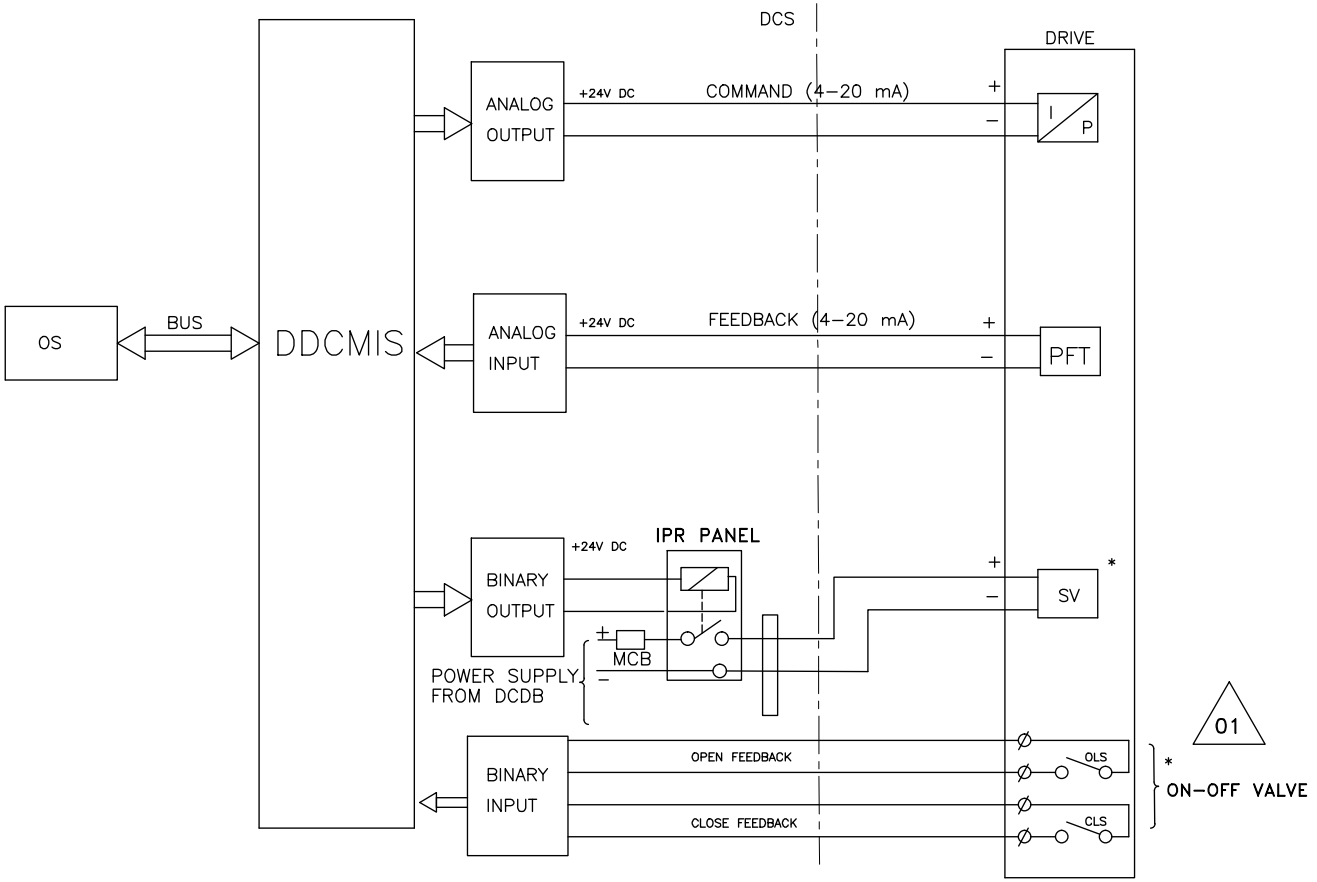
DRG. NO. 4-381-21-03556

SHT. 9 OF 11

THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED.
IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTREST OF THE COMPANY

INVENTORY NO | SIGN. AND DATE | REF. DRG. NO. E057-LOGICS-R01.DWG

DCS INTERFACE FOR ANALOG DRIVE(CONTROL AND ON-OFF APPLICATION)



NOTE:

1. * APPLICABLE FOR FAILSAFE ACTION ON INTERLOCK CONDITIONS FOR CONTROL VALVE.

TITLE	CARD CODE	DRAWING NO.	REV.
DRIVE CONTROL PHILOSOPHY		4-381-21-03556	02
		SHEET NO. 10 / NO OF SHEETS 11	

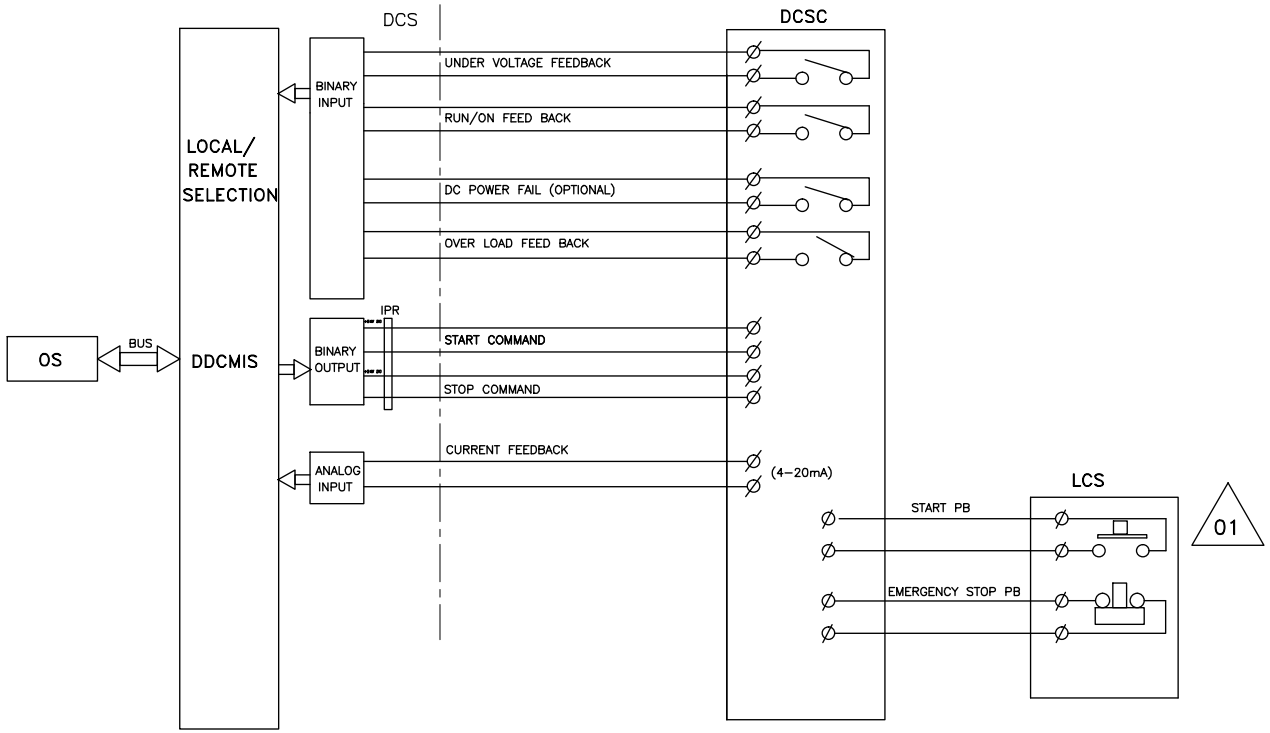
FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. 4-381-21-03556

SHT. 10 OF 11

DCS INTERFACE FOR DC DRIVE



THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED.
IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTREST OF THE COMPANY

INVENTORY NO | SIGN. AND DATE | REF. DRG. NO. E057-LOGICS-R01.DWG

TITLE	CARD CODE	DRAWING NO.	REV.
DRIVE CONTROL PHILOSOPHY		4-381-21-03556	02
		SHEET NO. 11	NO OF SHEETS 11