

# 3Ø FASD SMART CONTROLLER

15-25HP SUBMERSIBLE PUMP APPLICATION

MU-G15S, MU-G15HS, MU-G20S, MU-G20HS, MU-G25S

INSTRUCTION MANUAL



Electrical & Automation

Manufacturer assumes no responsibility for a hazard or damage caused by incorrect or non-application of any of the instructions attached herein. Use according to the operating instructions, professional practices, wiring rules, codes, safety regulations applicable to the given installation. Disconnect the power and isolate before proceeding with any work on this equipment.

Always use an appropriate voltage detection device to Confirm the absence of voltage.

Installation, commissioning and maintenance to be done by qualified personnel only

Hazards of electric shock and burning.

Carton & padding can be recycled.

Poly bags can be recycled separately

## GENERAL

MU-G15S/MU-G15HS/MU-G20S/MU-G20HS/MU-G25S  
3Ø FASD smart controller is suitable for 15 to 25HP motor at 415 V, 50Hz.  
It comprises of i-Smart, Digital Smart controller with MCB, CT assembly along with a MK1/MK2/MU1/MU1H/MU2/MU3 Contactor

### CONTROLLER ON-OFF SWITCH

Keep the Rocker switch in ON position to activate the controller.

### NOTE

- 1) Check the coil voltage before commissioning.
- 2) Refer wiring diagram where necessary
- 3) Ensure the controller is operated in Mounting condition only

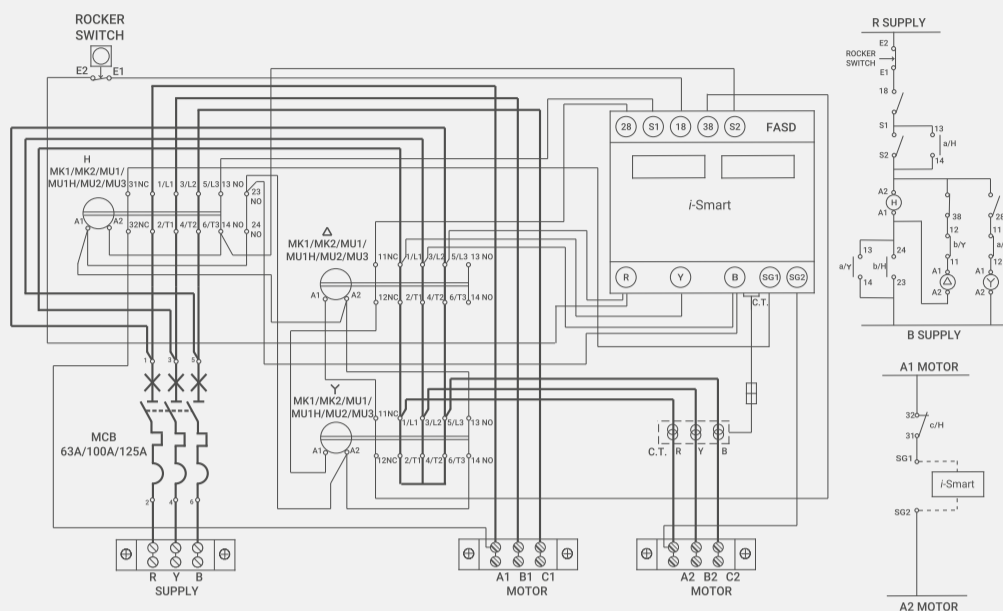
Weight of the product (without packaging) : 12.5 Kg

## DIGITAL SMART CONTROLLER

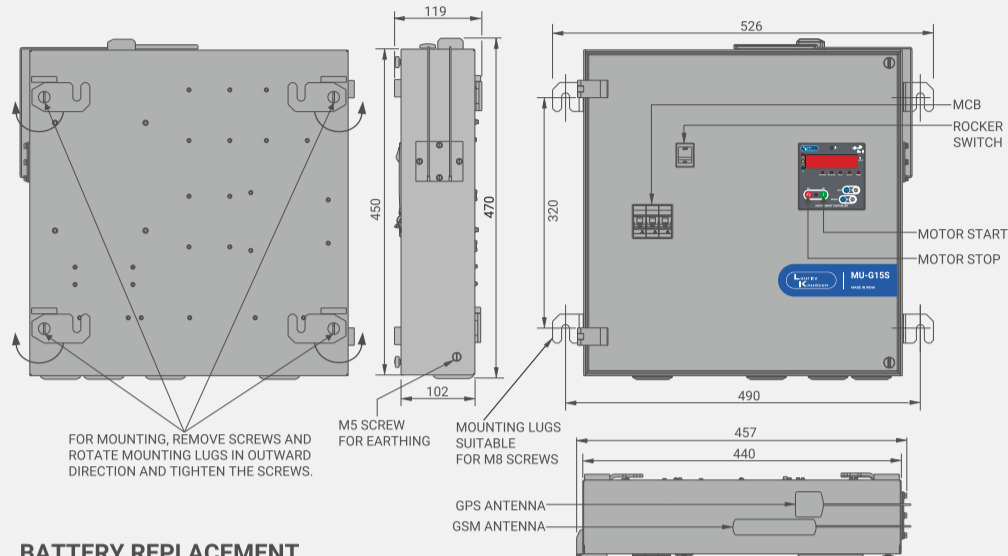
MU-G\*S FASD starter is provided with i-Smart electronic controller. Following are the features/protections offered by controller.

- 1) Single Phasing (Voltage and Current)
- 2) Phase Reversal
- 3) Phase Unbalance (Voltage and Current)
- 4) Under Voltage/Over Voltage
- 5) Water Level Sensing Controller
- 6) Locked Rotor
- 7) Dry Run
- 8) Overload
- 9) Auto Restart
- 10) Anti-theft Protection (Pump and Panel)
- 11) Remote starter ON/OFF operation through SMS / IVRS
- 12) GPS Based Location Tracking

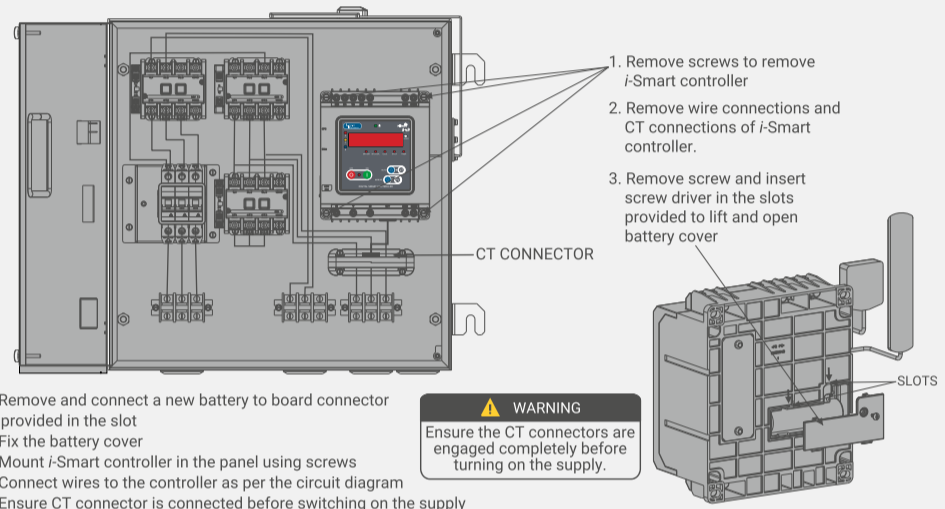
## CIRCUIT DIAGRAM



## OVERALL DIMENSIONS, PRODUCT MOUNTING AND FEATURES



## BATTERY REPLACEMENT



## USER INTERFACE

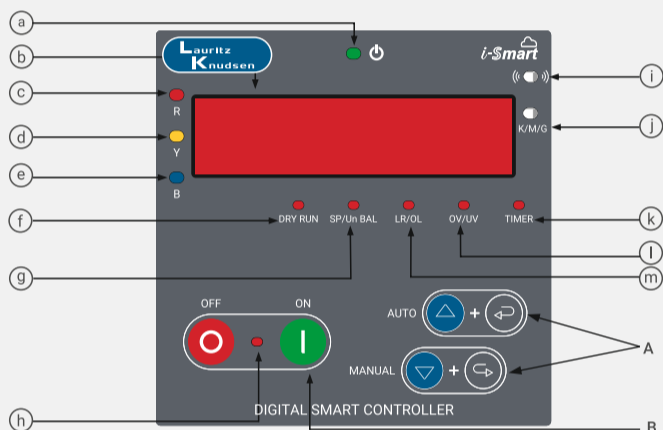


Fig 1.0

LED No	LED Name	LED Functionality
a	Power	ON: Healthy supply    Blink: Phase Reversal Fault
b	-	Seven segment display 888 888
c	R	ON: Presence of R phase voltage and metering
d	Y	ON: Presence of Y phase voltage and metering
e	B	ON: Presence of B phase voltage and metering
f	Dry Run	ON: Dry run Fault    Blink: Rated current setting
g	SP/Unbal	ON: Single Phasing Fault    Blink: Unbalance Fault
h	-	ON: Pump ON    OFF: Pump OFF
i	-	Network LED Red ON: No SIM Red Blink: SIM present but no network Green Blink: Registered on network
j	K, M, G	Power / Energy indication K: RED ON - Kilo M: GREEN ON - Mega G: ORANGE ON - Giga
k	Timer	Slow Blink: ON time delay timer running Fast Blink: Star-Delta Delay timer running ON: S1 is not connected properly or Rocker Switch OFF
l	OV/UV	ON: Over Voltage Fault    Blink: Under Voltage Fault
m	OL/LR	ON: Locked Rotor Fault    Blink: Overload Fault

Table 1.0

### A : Navigation Key details

- Down Key** is used to scroll down the parameter and to decrement parameter setting value
- Up Key** is used to scroll up the parameter and to increment parameter setting value
- Enter key** is used to enter into setting menu and to save the parameter setting values.
- Escape key** is used to escape from menu and return to the default screen.
- Auto Mode**: Up + Enter
- Manual Mode**: Down + Enter

### B : Push Buttons details

- PUMP OFF**: OFF button
- PUMP ON**: ON button

## INSTALLATION PROCEDURE

Before configuration keep both the Antennas outside the panel and GPS antenna should be always placed in "Open Sky" condition with top facing towards sky. Ensure Rocker Switch is ON.

**SIM Card Specification:** Mini SIM Card (2FF) – 2G. Insert the SIM Card in SIM Card slot as shown on the i-Smart.

On Power ON, if system is not previously configured and healthy supply voltage is present then display shows "Ir Aut" (Ir Aut), to set rated current of pump. If fault is present then display shows fault message, e.g. (FLt Phs).

### Phase Reversal Fault: (Power LED Blinking)

If the unit shows Phase reversal fault, then interchange any two phases of the incoming Power Supply to Starter/controller. For any other fault, please wait till system recovers to steady state / healthy supply voltage. When unit switches to "Ir Aut" screen, follow below steps:

#### Step 1: To set Rated current or Full Load current (FLC)

- At "Ir Aut" (Ir Aut) screen press ENTER (Enter) key.
- When "Ir rSt" (Ir rSt) and "Dry Run" LED starts blinking, Turn ON the Pump by pressing ON (ON) key on display after ODT is elapsed.
- Unit will automatically set the current flowing through the pump as a FLC of pump provided the current is within relay range.

Refer Table 2.0 for details of set relay and respective FLC range: Once rated current is set, display moves to Master Registration screen.

**Note:** Rated current will be set only in Delta configuration

Sr no	Relay Set	FLC range
1	22	4-22 A
2	32	13-32 A
3	42	13-42 A
4	42H	24-42 A

Table 2.0

#### Step 2: To Register Master number

- At "mAS rSt" (mAS rSt) screen press ENTER (Enter) key.
- When "mAS rSt" (mAS rSt) starts blinking, call on the inserted SIM card number.
- Unit will cut the call and set the number as master number.
- It shows last 3-digits on display of registered master number and send SMS to Master.
- Unit will set the GPS location of the installed pump and send SMS to registered Master number as GPS Fixed with Google Map link of the location.

**Note:** If there is error in setting GPS location, unit will send SMS as GPS not Fixed. Once Master number is set, display will move to periodic screen or metering screen.

## STARTER MODE

- 1. Auto Mode:** To set AUTO mode, Press UP (Up) & ESC (Esc) keys together or send SMS L240<space>1K or set through display navigation. In Auto mode, when ON time delay elapsed unit turns ON Pump automatically. No manual command is required. **Note:** But if Pump is turned OFF forcefully by SMS, IVRS or OFF button then unit will not turn ON automatically till next ON command or Power Reset.
- 2. Manual Mode:** To set MANUAL mode, Press DOWN (Down) & ENTER (Enter) keys together or send SMS L240<space>0K or set through display navigation. In Manual Mode user has to turn ON pump manually after ON time delay (through ON push button (ON)), SMS or IVRS).
- 3. Bypass Mode:** To set BYPASS mode, send SMS L240<space>2K or set through display navigation. In Bypass Mode, after ON time delay user has to turn ON pump manually. Unit will not trip in any fault; it bypasses the protection feature. Hence no protection is provided against any fault. User will get indication of fault through Display and SMS only.

## DISPLAY NAVIGATION

There are total 6 keys given on the front panel of Digital Smart Controller – UP (Up), DOWN (Down), ENTER (Enter), ESC (Esc), ON (ON) and OFF (OFF) ref fig 1.0. User can perform PUMP ON and PUMP OFF operation using ON and OFF push buttons. UP, DOWN, ENTER and ESC push buttons are used for navigation and changing mode. Digital Smart Controller has four types of navigation screens:

- Periodic Auto Scroll Display:** This is the default display mode. User can only see the Metering parameters. Time out for each parameter is 3 Sec.
- View Metering Parameters:** User can go to this mode by pressing UP (Up)/ DOWN (Down) key. In this mode, user can see metering parameters 1 by 1 pressing UP and DOWN key. ESC key is used to come out of this mode or if no key is pressed, then timeout is 1 min.
- View Setting Parameters:** User can go to this mode by pressing ENTER (Enter) key. In this mode, user can only see the set value of parameters but cannot change it except for GSM signal strength. User can check signal strength by pressing ENTER key at S19 (5:9). ESC key is used to come of this mode.
- Set Parameter:** This mode is Password protected, if password is valid then user can change and save the settings. User can go to this mode by entering Password at "SYS SET" parameter. Default Password "111".

Sr.No	Periodic/View Parameter	View Set Parameter	Set Parameter
1	Voltage RY	U <sub>RY</sub>	Mode
2	Voltage YB	U <sub>YB</sub>	System Type
3	Voltage BR	U <sub>BR</sub>	Rated voltage
4	Current R	I <sub>R</sub>	Rated Current
5	Current Y	I <sub>Y</sub>	Relay Range
6	Current B	I <sub>B</sub>	**Language Set
7	Power Factor	PF	Dry Run Pickup
8	Power	P	ON Delay Time
9	Energy	E <sub>n</sub>	Star-Delta Delay time
10	*Battery Low	bALt Lo	Dry Run Reset time
11			Lock Rotor Trip Time
12			GSM Signal
13			System Setting

\*: If battery voltage is LOW, \*\*: Language as per Region (C-Central, S-South, E-East, N-North)

### SCROLLING PARAMETERS

U<sub>RY</sub> 423  
U<sub>YB</sub> 409  
U<sub>BR</sub> 407  
I<sub>R</sub> 723  
I<sub>Y</sub> 806  
I<sub>B</sub> 524  
PF 099  
P 125  
E<sub>n</sub> 139  
bALt Lo

### VIEW PARAMETERS

Mode nAn  
System Type 545  
Rated voltage U<sub>RY</sub>  
Rated Current I<sub>R</sub> 415  
Relay Range I<sub>R</sub> 4.0  
\*\*Language Set rLy 22  
Star-Delta Delay time LAn  
Dry Run Pickup dr 50  
ON Delay Time odt 30  
Star-Delta Delay time 5dt 7  
Lock Rotor Trip Time Lrt 10  
GSM Signal 5:9 99  
System Setting 545 SET

### SET PARAMETERS

PAR --- PAR 111  
(Enter Password "111")  
Mode nAn  
System Type nAn  
Rated voltage Ir Aut  
Rated Current Ir rSt  
Relay Range Ir nAn  
Rated Current Ir 4.0  
Relay Range dr 50  
ON Delay Time odt 30  
Star-Delta Delay time 5dt 7  
Lock Rotor Trip Time Lrt 10  
GSM Signal nAS rSt  
System Setting PAR rSt  
PAR SET (Enter new 3 digit password)

SET YES  
SET NO

SCROLLING PARAMETERS

## FACTORY DEFAULT SETTINGS

Sr. no	Parameter	Factory Default Setting	User Setting		
			Min	Max	Step
1	Rated Current (A)	4/13/24 as per set relay range	4/13/24	22/32/42	As per FLC
2	Rated Coil Voltage (V)	360 WB/415/400-440	Fixed as per Contactor coil		
3	On Time Delay (sec)	30	30	300	30 sec
4	Star-Delta Time Delay (sec)	7	2	30	1 sec
5	Dry Run Pickup (%)	65	50	90	5%
6	Dry Run Reset Time (min)	30	15	300	30 (minimum value 15 then 30 & step of 30)
7	Locked Rotor Trip Time (sec)	1.0	0.1	3.0	0.1sec
8	Locked Rotor Threshold	5*Rated current or Ir/ly/lb >175A	Fixed		
9	Overload Protection	Class 10A, 4sec@7.2lr	Fixed		
10	Under voltage threshold (V)	For values Refer Table 7	Variable (Refer Table 7)		
11	Over voltage threshold (V)	For values Refer Table 7	Variable (Refer Table 7)		
12	Phase to phase Current unbalance %	30	Fixed		
13	Phase to phase voltage unbalance voltage (V)	50	Fixed		
14	Starter Mode	Manual	Auto / Manual / Bypass		
15	All Protections	Enable	Enable / Disable		
16	IVRS / Missed Call Facility	IVRS : Enable, Missed call : Disable	Enable / Disable		
17	Status alerts to Master & Users	Enable	Enable / Disable		

Table 3.0

## FAULT INDICATION

Sr. No	Fault	LED Indication	Display Indication
1	Voltage Single Phasing	SP/Un Bal LED: ON	FL E U5P
2	Current Single Phasing	SP/Un Bal LED: ON	FL E I5P
3	Phase Reversal	POWER LED: BLINK	FL E Phr
4	Current Unbalance	SP/Un Bal LED: BLINK	FL E UOb
5	Voltage Unbalance	SP/Un Bal LED: BLINK	FL E UOb
6	Under Voltage	OV/UV LED: BLINK	FL E UL0
7	Over Voltage	OV/UV LED: ON	FL E UH:
8	Locked Rotor	OL/LR LED: BLINK	FL E Lr
9	Dry Run	Dry Run LED: ON	FL E dr
10	OverLoad	OL/LR LED: ON	FL E OL
11	Lower Tank Empty	LTE/UTF LED: ON	FL E L E E
12	Upper Tank Full	LTE/UTF LED: BLINK ON	FL E U E F

Table 4.0

In fault condition display continuously Shows "Flt <name>" (e.g. FL E U5P) In R/B voltage single phasing, no phase presence LED Indication is provided.

Following are the Fault reset options in AUTO, MANUAL or BYPASS mode.

### 1. Fault Reset- Automatically:

Modes	Voltage Fault	Current Fault	Dry Run Fault
Auto Mode	Yes	No	Yes, after Dry Run reset delay elapsed
Manual Mode			
Bypass Mode	Yes	Yes	Yes

### 2. Fault Reset- Manually:

1. Display: Press OFF button (⊖)
2. SMS: L402K
3. If Pump ON command is given remotely through SMS (L001K) or IVRS then unit first RESET the fault then turn ON the pump But if fault still persists in the system then unit replies with existing fault SMS and displays error message on screen (E\_r\_r).

## SMS STRUCTURE

Sr. no	Functionality	Query format
<b>Master operated Queries</b>		
1	Register secondary master or user (1 user at a time)	L111<space><user1 mobile number>K L112<space><user2 mobile number>K L113<space><user3 mobile number>K
2	Delete user	L120<space><registered user number>K
3	Set Full Load current (in Pump ON condition)	L211K
4	Set ON time delay (value: 30-300 in step of 30 sec)	L212<space><value>K
5	Set Star-Delta time delay (value: 2-30 in step of 1sec)	L213<space><value>K
6	Set dry run reset delay (value: 15, 30-300 in step of 30 min)	L214<space><value>K
7	To set balance code (value: USSD code without L and K) (Eg. - For USSD code : *121*2#, value : 121*2 to be used)	L215<space><value>K
8	Set starter mode (value: 0-Manual, 1-Auto, 2-Bypass)	L240<space><value>K
9.1	Dry Run Protection (value: 1- Enable, 0- Disable)	L221<space><value>K
9.2	Dry Run Pickup Percentage (value: 50- 90%, step of 5%)	L221<space><value>K
10	OverLoad Protection (value: 1- Enable, 0- Disable)	L222<space><value>K
11	Phase reversal Protection (value: 1- Enable, 0- Disable)	L223<space><value>K
12.1	Over voltage Protection (value: 1- Enable, 0- Disable)	L224<space><value>K
12.2	Over voltage Pickup Settings (value: 410-440 in step of 1V)	L224<space><value>K
13.1	Under voltage Protection (value: 1- Enable, 0- Disable)	L225<space><value>K
13.2	Under voltage Pickup Settings (value: 240-300 in step of 1V)	L225<space><value>K
14	Voltage single phase Protection (value: 1- Enable, 0- Disable)	L226<space><value>K
15	Current single phase Protection (value: 1- Enable, 0- Disable)	L227<space><value>K
16	Current unbalance Protection (value: 1- Enable, 0- Disable)	L228<space><value>K
17.1	Locked Rotor Protection (value: 1- Enable, 0- Disable)	L229<space><value>K
17.2	Locked Rotor protection trip time (value: 100-3000 msec, in step of 100msec)	L229<space><value>K
18	Voltage unbalance Protection (value: 1- enable, 0- disable)	L230<space><value>K
19.1	Daily timer (value: 1- Enable, 0- Disable)	L234<space><value>K
19.2	Set daily timer. 4 time slots can be set per day. (value1: ON time, value2: OFF time - 0001-2359, HHMM-24Hrs format) Time slots should not overlap, minimum difference between two timers - 1 min	L234<space>1<space><value1><space><value2><space>2<space><value1><space><value2><space>3<space><value1><space><value2><space>4<space><value1><space><value2>K
20	Sync RTC	L235K
21	Auto Balance for Master (value: 1- Enable, 0- Disable)	L265<space><value>K
22	Status update to Master (value: 1- Enable, 0- Disable)	L268<space><value>K
23	Pump and Panel Theft Protection (value: 1-Enable, 0-Disable)	L280<space><value>K
24	Set GPS	L371K
<b>Master as well as User operated Queries</b>		
25	Pump OFF	L000K
26	Pump ON	L001K
27	Fault Reset	L402K
28	Display user list	L130K
29	Read Pump status	L310K
30	Read Total run time of pump (value: 1- to read, 0-clear (Clear authority only Master)	L320<space><value>K
31	Read set parameters	L330K
32	Read balance of inserted SIM card	L340K
33	Read IMEI number	L350K
34	Read Signal Strength	L360K
35	Read GPS information	L370K
36	Read protection setting	L380<space>1K
37	Read facility setting	L390<space>1K
38	Change language, English default language for all users (value: 1 - English, 2 - Hindi, 3 - Language3, 4 - Language4, 5 - Language5 ), Refer Table no: 6	L241<space><value>K
39	Power ON/OFF Call (value: 1-Enable, 0-Disable)	L261<space><value>K
40	Power ON/OFF SMS (value: 1-Enable, 0-Disable)	L262<space><value>K
41	Feedback call after fault (value: 1-Enable, 0-Disable)	L263<space><value>K
42	Feedback SMS after fault (value: 1-Enable, 0-Disable)	L264<space><value>K
43	Missed call facility (value: 1-Enable, 0-Disable)	L266<space><value>K
44	IVRS facility (value: 1- Enable, 0- Disable)	L267<space><value>K
45	Set Pump ON Duration: Pump turns ON immediately for given duration without time compensation.(value: 0001- 1200, HHMM - 24hrs format, Maximum 12 Hours)	L231<space><value>K
46	ON immediately for given Duration with Time compensation. (value: 0001- 1200, HHMM - 24hrs format, Maximum 12 Hours)	L232<space><value>K
47	Read daily timers	L234<space>2K

Table 5.0

- SMS no. 1 to 24: Access and Reply only to Master.  
 SMS no. 25 & 26: If SMS is sent by User Then User as well as Master will receive respective Pump ON/OFF SMS.  
 SMS no. 26 & 27: If Fault persists in the system then sender will receive respective Fault SMS instead of Pump ON or Fault Reset SMS.  
 SMS no. 27 to 47: Reply only to the Sender.  
 SMS no. 38: Selected language will be applicable only to sender of SMS.  
 SMS no. 43 & 44: If IVRS facility is enabled, then Missed call facility is disabled and vice-versa.  
 SMS no. 45 & 46: If user sets the Timer Then Master will also receive Timer set SMS.

Under following condition Master or user will receive SMS from unit (If master and users are enabled to receive alert SMS)

Pump ON/OFF SMS: For every Pump ON/OFF event, Master will receive SMS.

Fault SMS: For any fault Master and Users will receive fault SMS.

Fault Reset: If Fault is Reset manually through display (OFF button), then only Master will receive Fault Reset SMS.

Power ON / OFF: At every Power ON or Power Fail event, Master and Users will receive SMS.

Emergency alert: Only Master will receive Emergency alert SMS if unit is moved from its installed position or GPS Signal Not received or unit to pump wiring is disturbed.

Region	Language 1	Language 2	Language 3	Language 4	Language 5
Central	English	Hindi	Kannada	Telugu	Punjabi
South			Kannada	Telugu	Tamil
North			Marathi	Gujarati	Punjabi
East			Odia	Assamese	Bengali

Table 6.0

		Rated Coil Voltage		
		360V WB	415V	400-440V
Under Voltage	Default	210	250	320
	Range	210-250	250-350	320-350
Over Voltage	Default	440	460	480
	Range	420-450	450-480	460-480

Table 7.0

- NOTE: 1) Do not insert Jio SIM card in i-smart as Jio SIM is not compatible with 2G network.  
 2) Response to certain SMS commands may vary as per TRAI regulations.

## IVRS STRUCTURE

If IVRS facility is enabled, then Missed call facility is disabled and vice-versa.

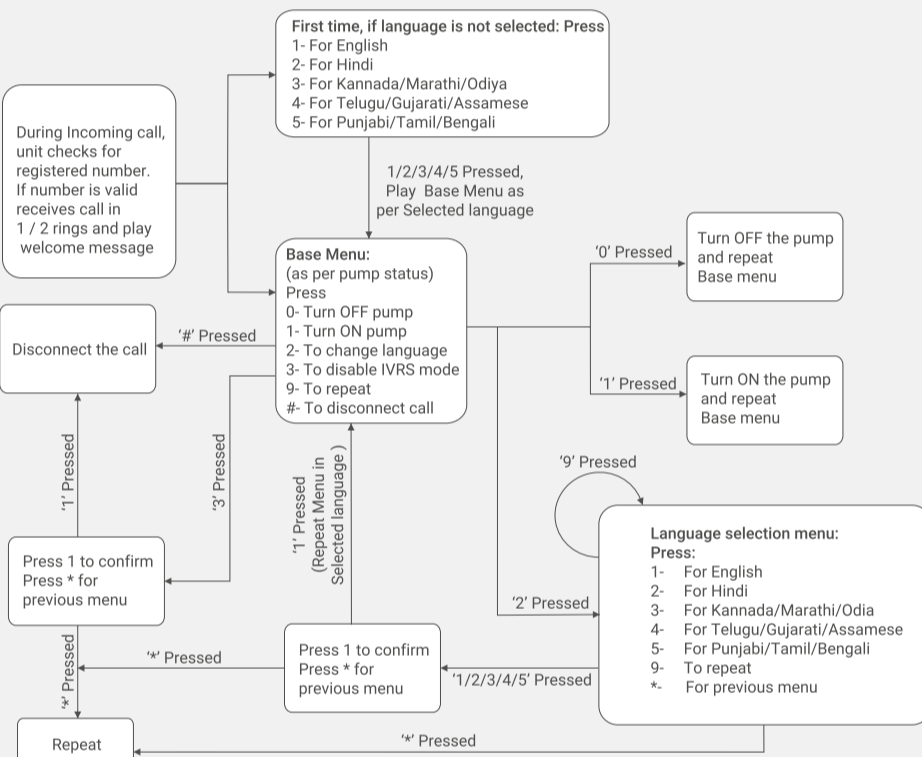
### IVRS MODE:

Under following conditions unit gives call to Main Master and User if they are enabled to receive alert calls.

1. At every power ON/OFF gives call Only to Main Master.
2. At every current fault gives call to Main Master as well as registered users.
3. On disconnection of pump wire gives alert call to Main Master.
4. If unit is moved from its installed position, gives alert call to Main Master

### MISSSED CALL MODE :

If missed call facility is enabled, then unit cuts call after 3 rings and turns ON the Pump if pump is in OFF condition or turns OFF the pump if pump is in ON condition.



Note: If any number pressed other than given options then: "Please give valid input"

## PRODUCT ORDERING & CATALOGUE NUMBERS

Type	Maximum Submersible Pump Rating at 30, 415V, 50Hz		Relay Range (A)	Catalogue No.	
	HP	kW		Coil Voltage 360V WB	Coil Voltage 400/440V
MU - G15S	15	11	4 - 22	CS91529C D	CS91529P D
MU - G15HS	15	11	13 - 32	CS91530C E	CS91530P E

i-Smart Spares	
15 - 25HP	CS914140 O

Type	Maximum Submersible Pump Rating at 30, 415V, 50Hz		Relay Range (A)	Catalogue No.	
	HP	kW		Coil Voltage 360V	Coil Voltage 415V
MU - G20S	20	15	4 - 22	CS91531C D	CS91531D D
MU - G20HS	20	15	13 - 32	CS91531C E	CS91531D E
MU - G25S	25	19	13 - 42	CS91532C F	CS91532D F
MU - G25HS	25	19	24 - 42	CS91533C F	CS91533D F

Ordering Code	Region	Language 1	Language 2	Language 3	Language 4	Language 5
C	Central	English	Hindi	Kannada	Telugu	Punjabi
S	South			Kannada	Telugu	Tamil
N	North			Marathi	Gujarati	Punjabi
E	East			Odia	Assamese	Bengali

Ordering Code	Version
O	Basic
W	With Water Level Controller

## TERMINATION CAPACITY

Type	Lug Termination - Supply			Lug Termination - Motor		
	Cross Section	Max. Palm Width	Tightening Torque	Cross Section	Max. Palm Width	Tightening Torque
MU-G15S/15HS/20S	16 Sq. mm	12 mm	1.3 Nm	16 Sq. mm	12 mm	1.3 Nm
MU-G20HS/25S	35 Sq. mm	20 mm	3.8 Nm	16 Sq. mm	12 mm	1.3 Nm