SG ——————— **Stage**
Drive idle stage
Idle
Stage   **S0**

Idle 2

Roll-off roof brake release
Local S0:oPT9
Brake_start
Y9
┤ ├ ─────────────────────────── E/R

TMRDOWN ——————— Down Timer
Brake_tmr
Timer Struct   T9
Preset   2.000s

Idle 3

| GS3 drive movement transitioning state | GS3 drive movement status | Roll-off roof brake release | Brake_tmr.Done | Roll-off roof brake release |
Modbus 40412 — Status_2:0 — MHR412:0 ─┤/├─ Modbus 40412 — Status_2:1 — MHR412:1 ─┤/├─ Local S0:oPT9 — Brake_start — Y9 ─┤ ├─ T9.Done ─┤ ├───────────

Roll-off roof brake release
Local S0:oPT9
Brake_start
Y9
(RST)

Idle 4

VDF desired frequency output
Modbus 40413
VDF_des_freq
MHR413   70
─┤ ≠ ├──────────────────────────>

MWX ——————— Modbus Network Write

Device   @IntSerModbusClient
Unit ID   1
Function Code   6 - Write Single Register
            Modbus Address 4… + offset value entered below
To Modbus Offset Address   2331
Constant   70
On Success, Set bit   C108
On Error, Set bit   C208

Select the direction of the motor.
Off => Forward direction (Close roll-off)
On => Reverse direction (Open roll-off)

Idle 5

GS3 drive direction
Modbus 40412
Status_2:4
MHR412:4   0
─┤ ≠ ├──────────────────────────>

MWX ——————— Modbus Network Write

Device   @IntSerModbusClient
Unit ID   1
Function Code   6 - Write Single Register
            Modbus Address 4… + offset value entered below
To Modbus Offset Address   2333
Constant   0
On Success, Set bit   C109
On Error, Set bit   C209

To move the roll off, the system has to be in:
Remote mode (local enable off)
E-stop not triggered (Estop_status off)
Motor direction commanded has to agree with GS3 direction (Motor_dir == Status_2:4)

Idle 6

Roll-off movement enable bit	Telescope platform on local mode	Shows if E-stop is active	GS3 drive direction
Modbus 00100	Modbus 00003	Local S1:iPT24	Modbus 40412
Dome_enable	Local_enable	Estop_status	Status_2:4
MC100	MC3	X40	MHR412:4 = 0

JMP ——— Transition From This Stage
Drive subprogram
(Deprecated)
R_brakes
Transition To   S1

Local enable is normally open, as system will jump to Local enabled stage if
Local_enable is on (Local mode)

Idle 7

Telescope platform on local mode
Modbus 00003
Local_enable
MC3

JMP ——— Transition From This Stage
Drive subprogram
(Deprecated)
R_brakes
Transition To   S1

SG ——————— Stage
Drive subprogram
(Deprecated)
R_brakes
Stage   S1

R_brakes 9

$On
ST1

TMRDOWN ——— Down Timer
Brake_tmr
Timer Struct   T9
Preset   2.000s
E/R

Roll-off roof brake release
Local S0:oPT9
Brake_start
Y9

Roll-off roof brake release
Local S0:oPT9
Brake_start
Y9
(SET)

R_brakes 10

Brake_tmr.Done	Telescope platform on local mode	Shows if E-stop is active
	Modbus 00003	Local S1:iPT24
T9.Done	Local_enable	Estop_status
	MC3	X40

JMP ——— Transition From This Stage
Drive subprogram
(Deprecated)
Motor_start
Transition To   S2

Telescope platform on local
mode
Modbus 00003
Local_enable
MC3

R_brakes
11 ┤├────────────────────────────────────

```
JMP ──── Transition From This Stage

        Drive idle stage
              Idle
Transition To                    S0
```

Shows if E-stop is active
Local S1:iPT24
Estop_status
X40
┤├

Roll-off movement enable bit
Modbus 00100
Dome_enable
MC100
(RST)

```
SG ─────────── Stage
   Drive subprogram
    (Deprecated)
    Motor_start
Stage                S2
```

$On
ST1

Motor_start
13 ┤├── E/R

```
TMRDOWN ──── Down Timer
          Brake_tmr
Timer Struct              T9
Preset                 2.000s
```

Roll-off roof brake release
Local S0:oPT9
Brake_start
Y9
┤/├

Roll-off roof brake release
Local S0:oPT9
Brake_start
Y9
(SET)

A

| Roll-off movement enable bit
Modbus 00100
Dome_enable
MC100 | VDF desired frequency
output
Modbus 40413
VDF_des_freq
MHR413 = 70 | Telescope platform on local
mode
Modbus 00003
Local_enable
MC3 | Shows if E-stop is active
Local S1:iPT24
Estop_status
X40 | Brake_tmr.Done
T9.Done | Roll-off roof brake release
Local S0:oPT9
Brake_start
Y9 |

Motor_start
14 ┤├──────┤├─────────────┤ ├────────────────┤/├──────────────┤/├──────────────┤├──────────────┤├──────

A

MWX ───────────────── Modbus Network Write
Device	@IntSerModbusClient
Unit ID	1
Function Code	6 - Write Single Register
	Modbus Address 4… + offset value entered below
To Modbus Offset Address	2332
Constant	1
On Success, JMP to stage	Movement
On Error, Set bit	C211
Exception Response	Drive_MB_except

Shows if E-stop is active
Local S1:iPT24
Estop_status
X40

Motor_start
15

MWX ───────────────── Modbus Network Write
Device	@IntSerModbusClient
Unit ID	1
Function Code	6 - Write Single Register
	Modbus Address 4… + offset value entered below
To Modbus Offset Address	2332
Constant	0
On Success, JMP to stage	Drive_disable
On Error, Set bit	C211
Exception Response	Drive_MB_except

Telescope platform on local
mode
Modbus 00003
Local_enable
MC3

Roll-off movement enable bit
Modbus 00100
Dome_enable
MC100
(RST)

SG ──────────── Stage
Drive subprogram
(Deprecated)
Movement
Stage   S3

Movement
17

$On
ST1

E/R

TMR ───────────────── Timer
	Dome_tout
Timer Struct	T0
Preset (ms)	Dome_move_tout

COPY ───────────────── Copy Data
#	Source	Destination	Count
1	Dome_tout.Acc	Curr_tout_tmr	1

Set the parameters to stop the drive:
- In case of current above 10 A (100)
- In case of user command (MC 100)
- Dome timeout (set to 2 min 25 sec)
Disabled a lower value for overcurrent & timeout of 5 sec.

If heartbeat is lost, wait to close, and jump to error state

If local mode activated, stop dome and jump to error state.

Rung 18 (Movement):

Contact / Label	Address	Tag	Element
VDF output current	Modbus 40415	Output_current	MHR415 ≥ 120
Telescope platform on local mode	Modbus 00003	Local_enable	MC3 (NC)
Heartbeat error status	Modbus 00602	HB_err_out	MC602 (NC)
Dome_tout.Done			T0.Done (NC)

Parallel branches:
- GS3 Status 1 — Modbus 40411 — Status_1 — MHR411 ≠ 0
- Roll-off movement enable bit — Modbus 00100 — Dome_enable — MC100 (NC)
- Dome_tout.Done — T0.Done

MWX — Modbus Network Write
Field	Value
Device	@IntSerModbusClient
Unit ID	1
Function Code	6 - Write Single Register
	Modbus Address 4… + offset value entered below
To Modbus Offset Address	2332
Constant	0
On Success, JMP to stage	Idle
On Error, Set bit	C212
Exception Response	Drive_MB_except

Roll-off movement enable bit
Modbus 00100
Dome_enable
MC100
(RST)

Roll-off roof brake release
Local S0:oPT9
Brake_start
Y9
(SET)

Second rung:

Heartbeat error status — Modbus 00602 — HB_err_out — MC602

Parallel: Dome_tout.Done — T0.Done

MWX — Modbus Network Write
Field	Value
Device	@IntSerModbusClient
Unit ID	1
Function Code	6 - Write Single Register
	Modbus Address 4… + offset value entered below
To Modbus Offset Address	2332
Constant	0
On Success, JMP to stage	Movement
On Error, Set bit	C213
Exception Response	Drive_MB_except

Roll-off movement enable bit
Modbus 00100
Dome_enable
MC100
(RST)

Roll-off error status
Modbus 00112
Rolloff_error
MC112
—(SET)—

Drive error LED output
Local S0:oPT12
Drive_error_led
Y12
—(SET)—

Roll-off roof brake release
Local S0:oPT9
Brake_start
Y9
—(SET)—

Movement
19

Telescope platform on local mode
Modbus 00003
Local_enable
MC3
——] [——

```
MWX ———————————————————— Modbus Network Write


Device                                    @IntSerModbusClient
Unit ID                                                     1
Function Code                  6 - Write Single Register
                          Modbus Address 4… + offset value entered below
To Modbus Offset Address                                2332
Constant                                                    0
On Success, JMP to stage                      Drive_disable
On Error, Set bit                                       C214
Exception Response                          Drive_MB_except
```

SG ——————————————— Stage
Drive is disabled due to local mode or heartbeat
Drive_disable
Stage   S4

S4
21

$On
ST1
——] [——

E/R

```
TMRDOWN ——————— Down Timer
              Brake_tmr
Timer Struct                    T9
Preset                      2.000s
```

Roll-off roof brake release
Local S0:oPT9
Brake_start
Y9
——]/[——

Roll-off roof brake release
Local S0:oPT9
Brake_start
Y9
—(SET)—

Rung S4 22

Roll-off roof brake release
Local S0:oPT9
Brake_start
Y9 ——| |——
Brake_tmr.Done
T9.Done ——| |——

Roll-off roof brake release
Local S0:oPT9
Brake_start
Y9
—(RST)—

Rung S4 23

Telescope platform on local mode
Modbus 00003
Local_enable
MC3 ——|/|——

Heartbeat error status
Modbus 00602
HB_err_out
MC602 ——|/|——

Roll-off error modbus reset
Modbus 00113
Drive_err_rst_mo
MC113 ——| |——

Physical switch disables hardware safety features
Local S1:iPT29
Eng_hw_mode_phy
X45 ——| |——

JMP —— Transition From This Stage
Drive idle stage
Idle
Transition To   S0

Roll-off movement enable bit
Modbus 00100
Dome_enable
MC100
—(RST)—

Roll-off error status
Modbus 00112
Rolloff_error
MC112
—(RST)—

Drive error LED output
Local S0:oPT12
Drive_error_led
Y12
—(RST)—

Roll-off error modbus reset
Modbus 00113
Drive_err_rst_mo
MC113
—(RST)—

Rung S4 24

—(NOP)—