DALI-2 Interface Description
Input Device

Content:

1   Version / Compatibility

This specification can be applied for all DALI-2 certified Input Devices from Steinel which are listed in the table in section EAN /GTIN.

2   DALI Communication

STEINEL DALI-2 input device sensor products comply with the following parts of the DALI-standard:

- IEC 62386 Part 101 ed 2.0 (2014-11)
- IEC 62386 Part 103 ed 1.0 (2014-11)
- IEC 62386 Part 303 ed 1.0 (2017-05)
- IEC 62386 Part 304 ed 1.0 (2017-05)

Input devices are normally used in combination with an DALI-2 application controller.

STEINEL-specific settings have been added because the standard does not cover all of the sensors functions. A complete description of these settings is to be found in chapter 0 of this document.

2.1 Sensor Instances

Each sensor input value is assigned to a separate DALI instance. Depending on the type of sensor, they are equipped with two or three instances. Instances are identified via type and number.

Motion sensor with light measurement:

Instance Number	Instance Type	Description
0	4	Brightness measuring
1	3	Motion detection

DualTech motion sensor with light measurement:

Instance Number	Instance Type	Description
0	4	Brightness measuring
1	3	Motion detection ultrasonic
2	3	Motion detection infrared

Dual light measurement:

Instance Number	Instance Type	Description
0	4	Brightness measuring (spot)
1	4	Brightness measuring (diffuse)

Control Pro II Series

Some devices from the series contain sensors for temperature and humidity. In order to expose their measurements to the DALI bus, two additional generic purpose instances are implemented.

HF 360 II DALI-2 IPD ECO:

Instance Number	Instance Type	Description
0	4	Brightness measuring
1	3	Motion detection

HF 360 II DALI-2 IPD:

Instance Number	Instance Type	Description
0	4	Brightness measuring
1	3	Motion detection
2	0	Generic purpose instance for temperature
3	0	Generic purpose instance for humidity

Hallway DALI-2 IPD ECO:

Instance Number	Instance Type	Description
0	4	Brightness measuring
1	3	Motion detection (Combined signal for both directions)
2	3	Motion detection (Towards the direction of the "S" of the STEINEL trademark)
3	3	Motion detection (Towards the direction of the "L" of the STEINEL trademark)

Hallway DALI-2 IPD:

Instance Number	Instance Type	Description
0	4	Brightness measuring
1	3	Motion detection (Combined signal for both directions)
2	3	Motion detection (Towards the direction of the "S" of the STEINEL trademark)
3	3	Motion detection (Towards the direction of the "L" of the STEINEL trademark)
4	0	Generic purpose instance for temperature
5	0	Generic purpose instance for humidity

2.2 Generic purpose instances

In the DALI standard (IEC62386-103), instance type 0 is reserved for input devices that are not defined. This allows the implementation of input devices that are not covered by the standard yet. The temperature and humidity sensor appear as a generic purpose instance on the bus and can be addressed with standard commands.

2.2.1 Temperature value

The generic purpose instance for temperature does not transmit any event messages and does not have any configuration parameters. The temperature value can be queried using the commands QUERY INPUT VALUE and QUERY INPUT VALUE LATCH. The 16 Bit value (binValue) can be converted to °C with the following equation:

$$T[°C] = (binValue \times 0.1 \ °C) - 5 \ °C$$

2.2.2 Humidity value

The generic purpose instance for humidity does not transmit any event messages and does not have any configuration parameters. The humidity value can be queried using the command QUERY INPUT VALUE. The 8 Bit value (binValue) can be converted to % with the following equation:

$$H[\%] = (binValue \times 0.5) \ \%$$

2.3 Identification

An identification procedure can be triggered via DALI commands. The sensor is equipped with a status LED which blinks while the sensor is in identification mode.

3   Factory default settings

STEINEL sensors are preprogrammed with optimized DALI settings regarding occupancy sensing. After a RESET Command, all settings changes back to their standardized reset value. An Application controller should be aware of the significance of this settings.

Setting	Steinel Value	Reset Value	Description
Hold Timer	1	90	Occupied state last for 10 seconds instead of 900 seconds
Report Timer	5	20	Motion status is reported every 5 seconds instead of 20 seconds
Event Filter	7	3	Activate repeat event too

Event Filter detail table:

Bit	Description	Value
0	Occupied event enabled	"1" = Yes
1	Vacant event enabled	"1" = Yes
2	Repeat event enabled	"1" = Yes
3	Movement event enabled	"0" = No
4	No movement event enabled	"0" = No
5	Reserved	0
6	Reserved	0
7	Reserved	0

4 Memory Bank 2 (STEINEL-specific)

Memory bank 2 is customer specific and used for STEINEL-specific features. The complete content and its purpose is shown in the following table.
Data can be queried via the "READ MEMORY LOCATION (DTR0, DTR1)" command.
Write access to NVM data positions is only possible if the memory bank is unlocked (Lockbyte = 0x55).

Note: The positions beginning with address 0x06 are only implemented in products from the Control Pro II Series (Products with type number ≥ 100)

Address	Description	Default value (factory)	Lockable	Memory type
0x00	Address of last accessible memory location	0x05	n/a	ROM
0x01	Reserved - not implemented	answer NO	n/a	n/a
0x02	Memory bank lock byte. Lockable bytes in the memory bank shall be read only while the lock byte has a value different from 0x55.	0xFF	NO	RAM
0x03	Sensor type	Sensor specific (see:4.1)	n/a	ROM
0x04	Sensor sensitivity	0xFF	YES	NVM
0x05	Detection range (HF / US)	0xFF	YES	NVM
0x06	Detection Range 1 / "S" (HF / US)	0x64	YES	NVM
0x07	Detection Range 2 / "L" (HF / US)	0x64	YES	NVM
0x08	Detection Range 3 (HF / US)	0x64	YES	NVM
0x09	Detection Range 4 (HF / US)	0x64	YES	NVM
0x0A	Detection Sensitivity 1 / "S" (HF / US)	0x64	YES	NVM
0x0B	Detection Sensitivity 2 / "L" (HF / US)	0x64	YES	NVM
0x0C	Detection Sensitivity 3 (HF / US)	0x64	YES	NVM
0x0D	Detection Sensitivity 4 (HF / US)	0x64	YES	NVM
0x0E	True Presence Scenario	0x07	YES	NVM
0x0F	True Presence Height (MSB)	0x0A	YES	NVM
0x10	True Presence Height (LSB)	0x28	YES	NVM
0x11	True Presence Radius (MSB)	0x0D	YES	NVM
0x12	True Presence Radius (LSB)	0xAC	YES	NVM
[0x13, 0xFF]	Reserved - not implemented	answer NO	n/a	n/a

4.1 Sensor type

The Sensor type number depends on the physical type of sensor. The following table shows all existing sensor types, its type numbers and its capabilities.

Type number	Sensor type	Sensitivity setting supported	Detection range setting supported	Dali current consumption
1	Control Pro IR Quattro	Yes	No	6mA
2	Control Pro IR Quattro HD	Yes	No	8mA
3	Control Pro HF 360	Yes	Yes	10mA
4	Control Pro Dual HF	Yes	Yes	14mA
5	Control Pro DualTech	Yes	Yes (US)	24mA
6	Control Pro US 360	Yes	Yes	24mA
7	Control Pro Single US	Yes	Yes	20mA
8	Control Pro Dual US	Yes	Yes	24mA
10	IR Quattro Slim XS	Yes	No	4mA
20	IS 3360 MX	Yes	No	6mA
21	IS 345 MX	Yes	No	6mA
22	Dual Light Sensor	No	No	6mA
24	IR Micro	Yes	No	4mA
30	IS 3180	Yes	No	6mA
31	IS 3360	Yes	No	6mA
35	IS 345	Yes	No	6mA
36	HF 3360	Yes	Yes	10mA
37	IR Quattro Micro	Yes	No	4mA
102	Hallway DALI-2 IPD ECO	Yes	Yes	25 mA *
103	Hallway DALI-2 IPD	Yes	Yes	25 mA *
106	HF 360 II DALI-2 IPD ECO	Yes	Yes	21 mA *
107	HF 360 II DALI-2 IPD	Yes	Yes	21 mA *

* Steinel specification for regular operation differs from max. current consumption according to IEC 62386-101

4.2 Sensor Sensitivity (Address 0x04)

This parameter is used to change the sensor sensitivity. If "high" sensitivity is selected, the sensor will respond to any movement immediately. If "low" sensitivity is selected, the sensor will respond after detecting several movements. The default value is "0xFF" (high sensitivity).

0x00 ➔ 0% lowest possible sensitivity

…

0xFF ➔ 100% highest sensitivity

Available for all motion sensors.

4.3 Detection Range (Address 0x05)

Detection range is used to adjust how strong a motion signal must be in order to recognize it as motion. This setting is only applicable for HF and US sensor technology.

0x00   ➜   0%   only very large movements are detected

…

0xFF   ➜   100%   minor movements are detected

4.4 Detection Range 1 - 4 (Address 0x06 - 0x09)

For some products of the Control Pro II Series, the detection range can be adjusted individually for different directions. This can be done by writing the value in percent to the corresponding location in Memory Bank 2.

Note: The detection range (address 0x05) is the global setting. Every time the global value is changed, the same value (converted to percent) will be written to the addresses for the different directions (0x06 – 0x09).

Orientation for Hallway sensors:

Address	Parameter	Description
0x06	Detection Range "S"	Detetction Range setting for the motion detection in the direction of the "S" of the STEINEL trademark
0x07	Detection Range "L"	Detetction Range setting for the motion detection in the direction of the "L" of the STEINEL trademark

0x00   ➜   0%   only very large movements are detected

…

0x64   ➜   100%   minor movements are detected

4.5 Sensor Sensitivity 1 - 4 (Address 0x0A - 0x0D)

For some products of the Control Pro II Series, the sensitivity can be adjusted individually for different directions. This can be done by writing the value in percent to the corresponding location in Memory Bank 2. Standard value is "0x64" (high sensitivity).

Note: The sensor sensitivity (address 0x04) is the global setting. Every time the global value is changed, the same value (converted to percent) will be written to the addresses for the different directions (0x0A – 0x0D).

Orientation for Hallway sensors:

Address	Parameter	Description
0x0A	Sensitivity "S"	Sensitivity setting for the motion detection in the direction of the "S" of the STEINEL trademark
0x0B	Sensitivity "L"	Sensitivity setting for the motion detection in the direction of the "L" of the STEINEL trademark

0x00　➜　0%　lowest sensitivity that is possible
…
0x64　➜　100%　highest sensitivity

4.6 True Presence Scenario (Address 0x0E)

For the True Presence, the scenario setting can be adjusted by writing to this memory location. A detailed description of the different scenarios can be found in the product manual.

0x01　➜　Scenario 1　Very noisy environments, heavy industry
…
0x09　➜　Scenario 9　Small office, quiet workplace

4.7 True Presence Height (Address 0x0F - 0x10)

For the True Presence, the setting for the installation height can be adjusted over the DALI bus by writing to these memory locations. The value for the installation height is stored in millimetres as a 16 bit value with address 0x0F containing the MSB and 0x10 the LSB.

1.500 (0x05DC)　➜　1,5 m
…
14.000 (0x36B0)　➜　14,0 m

4.8 True Presence Radius (Address 0x11 - 0x12)

For the True Presence, the setting for the radius can be adjusted over the DALI bus by writing to these memory locations. The value for the radius is stored in millimetres as a 16 bit value with address 0x11 containing the MSB and 0x12 the LSB.

500 (0x01F4)   ➔   0,5 m
…
7.500 (0x1D4C)   ➔   7,5 m

EAN /GTIN

Each sensor type has a unique "European Article Number" for clear identification. This number is stored in memory bank 0 at position 0x03 to 0x08 and can be queried via the "READ MEMORY LOCATION" command.

EAN / GTIN	Sensor Name
4007841068158	Control Pro IR Quattro
4007841057497	Control Pro IR Quattro HD
4007841057480	Control Pro HF360
4007841057459	Control Pro Dual HF
4007841057473	Control Pro US DualTech
4007841057534	Control Pro US 360
4007841057503	Control Pro US Aisle Single
4007841057466	Control Pro US Aisle Dual
4007841066239	Generation 3000 IS 3360 AP (without design cover)
4007841066246	Generation 3000 IS 3360 MX AP (without design cover)
4007841066253	Generation 3000 IS 345 AP (without design cover)
4007841066260	Generation 3000 IS 345 MX AP (without design cover)
4007841066277	Generation 3000 IS 3180 AP (without design cover)
4007841066284	Generation 3000 HF 3360 AP (without design cover)
4007841066291	Generation 3000 Dual Light Sensor AP (without design cover)
4007841066307	Generation 3000 IS 3360 UP (without design cover)
4007841066314	Generation 3000 IS 3360 MX UP (without design cover)
4007841066321	Generation 3000 IS 345 UP (without design cover)
4007841066338	Generation 3000 IS 345 MX UP (without design cover)
4007841066345	Generation 3000 IS 3180 UP (without design cover)
4007841066352	Generation 3000 HF 3360 UP (without design cover)
4007841066369	Generation 3000 Dual Light Sensor UP (without design cover)
4007841065034	IR Quattro Slim XS (without design cover)
4007841053871	IR Quattro Micro
4007841057732	IR Micro Sensor
4007841064532	Hallway DALI-2 IPD UP
4007841064549	Hallway DALI-2 IPD AP
4007841079048	Hallway DALI-2 IPD ECO UP
4007841079031	Hallway DALI-2 IPD ECO AP
4007841067465	HF 360 II DALI-2 IPD ECO UP
4007841067458	HF 360 II DALI-2 IPD ECO AP
4007841064280	HF 360 II DALI-2 IPD UP
4007841064297	HF 360 II DALI-2 IPD AP
0	No sensor connected